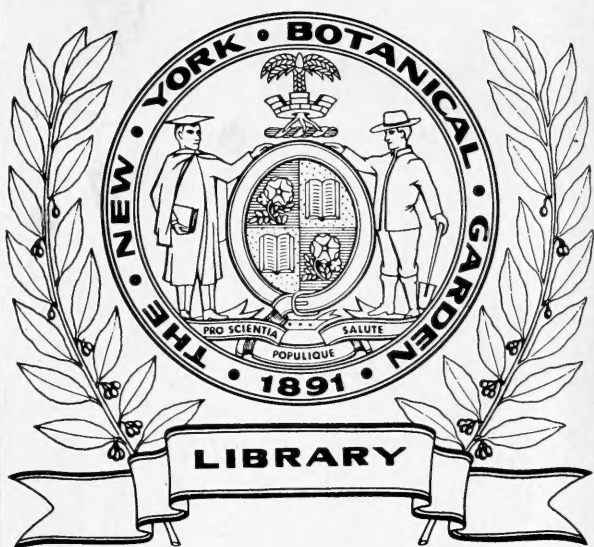


vol. 21
1971





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vol. 21
1971

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 21

January, 1971

No. 1

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
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Price of this number, \$1; per volume, \$7.50, in advance,
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A REVISION OF THE MOSS GENUS, HYMENOSTYLIELLA,
WITH DESCRIPTION OF SPOROPHYTE

Harold Robinson
Smithsonian Institution, Washington, D.C. 20560

Hymenostyliella is among those Pottiaceous genera having broadly lanceolate leaves with incurved margins and circinnate points when dry, similar vegetatively to Timmiella and Hyophila. The leaf cells bulging adaxially in a single layer and with greatly thickened corners prompted Bartram (1939) to establish a new genus even without fruiting material.

Until the present, the genus has been known only from Luzon Island in the Philippines, but a series of specimens has recently been obtained from around a sulfur spring in the Kumaon District of northern Uttar Pradesh, India. This material bears sporophytes which are lateral from small axillary perichaetia. Slight peculiarities of the upper surface of the costa recall a Brazilian species, Timmiella alata Herz., and I also place that species in Hymenostyliella. The following descriptions and key are intended to help in further understanding the genus.

Hymenostyliella Bartram, Philippine Journ. Sci. 68: 108. 1939.

Stems densely foliate, erect, with central strand. Leaves oblong lanceolate, strongly incurved when dry with inrolled margins, widely spreading when moist; costa percurrent or excurrent in short mucro, in section with two stereid bands, adaxial surface with row ridges or distinct wings; upper leaf cells isodiametric, unistratose, flat abaxially, highly convex adaxially; basal cells oblong, more lax. Perichaetia in lateral buds. Setae elongate, smooth; urn erect, smooth; peristome lacking; operculum very long rostrate, longer than urn; calyptra not seen.

Key to the species of Hymenostyliella

1. Adaxial surface of costa with only low serrulate ridges H. llanosii
1. Adaxial surface of costa with 2 large wings H. alata

The following synonymy and descriptions have been compiled from the literature and from the collections of H. llanosii from India.

Hymenostyliella llanosii (Broth.) H. Robinson, comb. nov.

Barbula llanosii C. Müll., Gen. Musc. Frond. 445. 1900.
nom. nud.

Timmiella llanosii [C. Müll.] Broth., Nat. Pfl. 1(3): 396.
1902.

Barbula pseudo-tortella C. Müll. in Broth., Nat. Pfl. 1(3):
396. 1902. nom. nud.

Hymenostylium involutum Card. & Thér., Bull. Soc. Bot.
Genève 26: 82. 1936.

Hymenostyliella involuta (Card. & Thér.) Bartr., Philippine
Journ. Sci. 68: 108. 1939.

Rather robust plants with stems 2-3 cm high, stems sparsely branching, rather densely tufted, densely foliate with leaves often in interrupted tufts, radiculose throughout. Leaves narrowly linear elliptical, sharply acute, 4-5 mm long, 0.5 mm wide, canaliculate-concave, margins inflexed and slightly repand in upper half, erect and entire below; base not or scarcely narrower; costa stout, to 120 μ wide at base, percurrent; adaxial cells of upper costa usually in 3 rather prominent rows, short with distal ends projecting, rows viewed from side as very low serrulate ridge; upper cells of lamina rather large, 10-12 μ wide, 10-15 μ long, lumens angular with prominent thickened corners, abaxial surface flattened with a very thick wall, adaxial surface strongly mamilllose with very fine striations on surface; basal cells colorless, not enlarged, quadrate to short rectangular, 10-12 μ wide, 8-20 μ long with rather irregularly thickened walls, a few cells at the margin very narrow. Dioicous. Perigonal numerous on male plants in axils of leaves, minute, to 0.5-0.6 mm long; bracts broadly ovate with short sharp acumination; costa slender, 20-25 μ wide; cells smooth, median and basal thin walled. Perichaetia ca. 2.0 mm long; inner leaves with colorless bases to 0.5 mm long, slender green tips 0.2 mm wide, costa to 50 μ wide at base; upper cells except marginal rather mamilllose adaxially, with thickened angles. Sporophyte reddish-brown; setae ca. 4 mm long, urn 1.0 x 0.5 mm, smooth and shining castaneous, few stomates at the base, exothecial cells mostly ca. 25 μ wide, 25-50 μ long, near mouth 3-4 rows quadrate 10-15 x 15 μ ; operculum erect, dark throughout, to 1.5 mm long. Spores 10-12 μ in diam., very minutely papillose.

Philippine Islands. Luzon: Bulacan Prov.; near the town of Calumpit, Ilanos s.n. Rizal Prov.; Montalban, Bartlett 14375, 14393.

India. Uttar Pradesh: W. Himalayas; Dehra Dun, Sulphur Springs, moist rocky cliffs and moist rocks, 768 m elev., June 1968, G.B. Pant Des (1) DS 9/1968, Des (2) DS 10/1968, Des (3) DS 11/1968.

The new collections represent a 3000 mile extension of the

known range of the species. The species may be more common than the collections indicate, but it must fruit rarely.

The fact that Brotherus validated Müller's epithet seems to have been overlooked by later authors. The simple descriptive statement in German by Brotherus (1902) was sufficient for validation at that time.

Hymenostyliella alata (Herz.) H. Robinson, comb. nov.

Timmiella alata Herz., Arch. Bot. Est. S. Paulo 1(2): 61.
1925.

Stems to 1.5 cm high, sparsely branched, rigid, densely foliate. Leaves narrowly oblong-lanceolate, acute, 2.5 mm long, 0.3 mm wide, canaliculate-concave, cucullate, sometimes mucronate, all but basal margins broadly involute; base scarcely broader than blade, short elliptical; nerve percurrent, bearing 2 prominent wings adaxially; wings ca. 12 cells high, 1 cell thick; cells of upper lamina small, mamilllose adaxially; basal cells rectangular, yellowish, subpellucid. Dioicous? Sporophyte unknown.

Brazil. without definite locality, Lützelburg s.n.

Material has not been seen, but the combination of leaf characters and especially the adaxial surface of the costa indicates close relationship to Hymenostyliella llanosii (Broth.) H. Robinson. Chen (1941) mentioned Herzog's species in his discussion of Hymenostyliella but apparently did not notice the slight ridging on the costa of H. llanosii. Additional material of H. alata should be sought and examined to confirm the position of the perichaetia.

Literature Cited

- Bartram, E. B. 1939. Mosses of the Philippines. Philippine Journ. Sci. 68: 1-437.
- Brotherus, V. F. 1902. Pottiaceae. Die Natürlichen Pflanzenfamilien i(3): 214: 385-432.
- Chen, P. 1941. Studien über die ostasiatischen Arten der Pottiaceae. I, II. Hedwigia 80: 1-76, 141-322.

A NEW SPECIES OF CYCLODICTYON FROM COSTA RICA

Harold Robinson
Smithsonian Institution, Washington, D.C. 20560

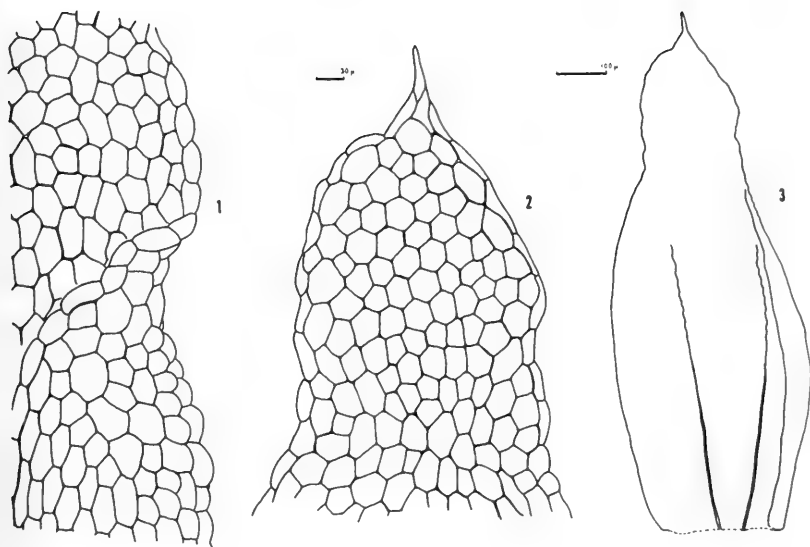
The rain forests of Central Costa Rica have been noted for many distinctive and apparently endemic species. To these may now be added the following previously undescribed species of Cyclodictyon.

Cyclodictyon jamesii H. Robinson, sp. nov. (Fig. 1-3)

Planta dioica?, robustiuscula, pallide virens, fragilis, in cortice putrido repens. Caules prostrati elongati, irregulariter dense ramosi. Folia laxè imbricata, ad 2.0 mm longa, 0.8 mm lata, oblonga vel late ovata, integra, in partibus superioribus constricta, apice distincte anguste apiculata; nervis binis divergentibus, prope constrictionem evanescentibus; cellulis nervorum uniseriatis; cellulis laminarum magnis laevibus, prope basin oblongis, 30 μ latis, ad 80 μ longis, superioribus rotundatis, ad 40 μ diam., in superficiebus abaxialibus saepe valde convexis, marginalibus in seriebus unicis elongatis. Cetera ignota.

Costa Rica. Puntarenas: Near Monteverde, forests, 4,300 ft. W. James 1969-44 (US, holotype; HERB. REED, isotype).

The species shows an unusually laxly leaved appearance for the genus, but the best distinguishing feature is the flat rather expanded apical part of the leaves. The leaf apices are rather fragile and undoubtedly serve as propagules. The single row of narrower marginal cells is most evident near the apex. The protruding cells on the back of the leaf are not always very noticeable.



Figures 1-3. *Cyclodictyon jamesii*. 1. Leaf at constriction showing back in profile. 2. Leaf apex. 3. Leaf showing double costa.

BRYOPHYTES OF MONTEVERDE, COSTA RICA

BY

CLYDE F. REED AND HAROLD ROBINSON
SMITHSONIAN INSTITUTION

SEVERAL COLLECTIONS OF BRYOPHYTES FROM MONTEVERDE, COSTA RICA (PUNTARENAS PROV.), HAVE BEEN COLLECTED BY MR. WALTER JAMES, HIS WIFE, MARY AND THEIR SON, JERRY OVER THE PAST EIGHT YEARS. IN ADDITION, THEY HAVE COLLECTED A LARGE NUMBER OF FERNS AND FERN-ALLIES FROM THE MOUNTAINOUS REGIONS ABOUT MONTEVERDE HAVE HAVE SENT THEM TO THE REED HERBARIUM. THESE WILL APPEAR IN ANOTHER PAPER. MONTEVERDE IS A SETTLEMENT ON THE WESTERN SLOPE OF COSTA RICA, AND NORTHWEST OF SAN JOSE. MOST OF THE SPECIMENS WERE COLLECTED FROM ELEVATIONS RANGING FROM 2500 TO 4500 FT. THE HABITATS VARY FROM DEEP FORESTS, ALONG STREAMS AND RIVERS TO EPIPHYTIC AND LITHOPHYTIC SITUATIONS ALONG ROADS, IN FIELDS AND IN JUNGLES.

A FEW OTHER COLLECTIONS OF BRYOPHYTES FROM COSTA RICA ARE ALSO INCLUDED. THEY INCLUDE A SMALL COLLECTION OF BRYOPHYTES FROM CLARENCE K. HORICH, WHO ALSO HAS COLLECTED MANY FERNS AND FERN-ALLIES FOR THE REED HERBARIUM; A SMALL COLLECTION FROM LUIS D. GOMEZ P. OF SAN JOSE; AND SEVERAL COLLECTIONS BY PAUL H. ALLEN, PAUL STANDLEY AND J. VALERIO. THESE COLLECTIONS ARE FROM VARIOUS OTHER AREAS OF COSTA RICA.

THE BRYOPHYTES REPORTED HERE ARE REPRESENTED BY 112 SPECIES OF MOSSES AND 77 SPECIES OF LIVERWORTS. SEVERAL NEW SPECIES HAVE BEEN DESCRIBED FROM THESE COLLECTIONS. ALL SPECIMENS ARE REPRESENTED IN THE REED HERBARIUM (R), BALTIMORE, MARYLAND, AND IN THE UNITED STATES NATIONAL HERBARIUM WHERE INDICATED (US).

MUSCI

SPHAGNACEAE

SPHAGNUM CAPILLACEUM (WEISS) SCHRANK - CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2124 (R).

SPHAGNUM RECURVUM P. BEAUV. - CERRO ASUNCION, 3145 M. ELEV., RAIN PARAMO. 1969. GOMEZ 2114 (R).

POLYTRICHACEAE

POGONATUM ROBUSTUM MITT. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MARCH 1963. W. JAMES (R;US).

POLYTRICHADELPHUS COSTARICENSIS BARTR. - PAN AMERICAN HIGHWAY, S OF CARTAGO. MAY 14, 1961. W. JAMES 104 (R); CERRO BUVIS, RAIN PARAMO, 3000-3150 M, EPIPHYTIC. 1969. GOMEZ 2118 (R).

POLYTRICHACEAE

- POLYTRICHUM JUNIPERINUM HEDW. - MONTEVERDE, WOODS. OCT. 22, 1962. W. JAMES (R); ON ROTTEN WOOD, MONTEVERDE. JAN. 9, 1965. M. JAMES 3 (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R); BELOW VOLCANO POAS, ALT. 8000 FT. MAR. 11, 1951. WANDA PONDER 4352 (R); CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2108 (R).

FISSIDENTACEAE

- FISSIDENS PRIONODES MONT. - MONTEVERDE, ON ROCK IN TRAIL TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 104B (R).
- FISSIDENS REPANDUS WILS. - MONTEVERDE, RIVER WOODS. MAY 1966. M. JAMES (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-21 (R).

GRIMMIACEAE

- RHACOMITRIUM CRISPIPILUM (TAYL.) JAEG. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).

FUNARIACEAE

- ENTOSTHODON BONPLANDII (BRID.) MITT. - PARAMO DE MADRESELVA, 3000 M ELEV., EPIPHYTIC. 1969. GOMEZ 2107 (R).

DICRANACEAE

- ATRACTYLOCARPUS COSTARICENSIS (C. MULL.) WILLIAMS - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63B12 (R).
- CAMPYLOPUS ARCTOCARPUS (HORNSCH.) MITT. - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63M9B (R).
- CAMPYLOPUS CHRISMARII (C. MULL.) MITT. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).
- CAMPYLOPUS CONCOLOR (HOOK.) BRID. - MONTEVERDE, WOODS ALONG GUACIMAL RIVER. JAN. 1968. W. JAMES 68-26 (R); FORESTS, 4300 FT. ELEV., NEAR MONTEVERDE. FEB. 1969. W. JAMES 1969-30 (US).
- CAMPYLOPUS FILIFOLIUS (HORNSCH.) MITT. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-16 (US).
- CAMPYLOPUS FLEXUOSUS (HEDW.) BRID. - MONTEVERDE, PASTURE WOODS, MAR. 10-17, 1965. W. & M. JAMES 96; WOODS. FEB. 1963. W. JAMES 63B38 (R) AND 63B17B (R).
- CAMPYLOPUS INTROFLEXUS (HEDW.) BRID. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); PASTURES ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 12 (R); JUNGLE FOREST. JUNE 1962. W. JAMES (R).
- CAMPYLOPUS SAVANNARUM (C. MULL.) MITT. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R).
- DICRANELLA RUFESCENS (SMITH) SCHIMP. - CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2112C (R).

DICRANACEAE

DICRANELLA VAGINATA (Hook.) CARD. - CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2112A (R); PARAMO DE MADRESELVA, 3000 M ELEV., EPIPHYTIC. 1969. GOMEZ 2110 (R).

DICRANODONTIUM MERIDIONALE BARTR. - FORESTS NEAR MONTEVERDE, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-23 (US); PROV. HEREDIA, CERROS DE ZURQUI, NE OF SAN ISIDRIO, ALT. 2000-2400 M. MAR. 3, 1926. PAUL C. STANDLEY 50336 (R).

DICRANOLOMA BRITTONIAE BARTR. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-11 (US).

HOLOMITRIUM ARBOREUM MITT. - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63B31 (R).

LEUCOLOMA SERRULATUM BRID. - MONTEVERDE, PASTURE WOODS AND ALONG PATH TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 37, 56, 107. (R); PASTURES ON TREES AND LOGS. JAN 9, 1965. M. JAMES 22 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B17A. (R); ON TREES IN FOREST NEAR MOTAS, MONTEVERDE. APR. 4, 1969. W. JAMES 1969-101 (R); FORESTS ALONG SOUTH LINE, MONTEVERDE. MAR. 16, 1969. W. JAMES 1969-76 (US).

PILOPOGON GRACILIS (Hook.) BRID. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R); CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2113 (R); CERRO ASUNCION, 3145 M ELEV., RAIN PARAMO. 1969. GOMEZ 2119 (R).

LEUCOBRYACEAE

LEUCOBRYUM ANTILLARUM SCHIMP. EX BESCH. - MONTEVERDE, RIVER BANK. MAR. 10, 1965. W. JAMES 4 (R); JUNGLE FOREST. JUNE 1962. W. JAMES (R); WOODS. OCT. 22, 1963. W. JAMES (R); FEB. 1963. W. JAMES 63B4 (R); ON TREES, LA ESTRELLA, PROV. DE CARTAGO. MAR. 26, 1924. P. C. STANDLEY 39245 (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN 1968. W. JAMES 68-22 (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-6 (R).

LEUCOBRYUM GIGANTEUM C. MULL. - MONTEVERDE, FORESTS. OCT. 1967. W. JAMES (R); FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-21 (US); OCT. 22, 1963. W. JAMES (R).

CALYMPERACEAE

SYRRHOPODON INCOMPLETUS SCHWAEGR. - MONTEVERDE, ON PATH TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 17 (R).

POTTIACEAE

LEPTODONTIUM EXCELSUM (SULL.) BRITT. (L. ULOCALYX (C. MULL.) MITT.) - MONTEVERDE, ALONG RIVER BANK. MAR. 10-17, 1965. W. & M. JAMES 12 (R); HEIGHTS OF LA CARPENTERA, VIC. TRES RIOS, 1300-2000 M ELEV. DEC. 1937. P. H. ALLEN (R).

BRYACEAE

- ACIDODONTIUM MEGALOCARPUM (Hook.) Ren. et Card. - MONTEVERDE, ON RECENT CLEARING. JAN. 9, 1965. W. JAMES 6 (R).
- ANOMOBRYUM FILIFORME (Dicks.) Solms in Rabenh. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R).
- BRYUM CAPILLARE Hedw. - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63B16 WITH ATRACTYLOCARPUS COSTARICENSIS. (R); W. JAMES 63B20 (R;US).
- BRYUM TRUNCORUM (Brid.) Brid. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R).
- POHLIA FLEXUOSA Hook. - CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2111 (R).

MNIACEAE

- MNIUM ROSTRATUM Schrad., var. LIGULATUM Herz. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R); EPIPHYTIC ON LICHENS, LA CARPENTERA, VIC. TRES RIOS, 1300-2000 M ELEV. DEC. 1937. P. H. ALLEN (R); MONTEVERDE, RECENT CLEARING. JAN. 9, 1965. W. JAMES 9 AND 39 (R); ALONG BANK OF RIVER, MONTEVERDE. MAR. 10, 1965. W. & M. JAMES 9 (R).

RHIZOGONIACEAE

- RHIZOGONIUM SPINIFORME (Hedw.) Bruch - MONTEVERDE, ALONG RIVER BANK. MAR. 10, 1965. W. JAMES 1 AND 8 (R); MONTEVERDE, ON PATH TO SPRING. MAR. 17, 1965. M. JAMES 78 (R); MONTEVERDE, PASTURE WOODS, MAR. 17, 1965. W. JAMES 27A WITH POROTRICHUM LONGIROSTRE. (R); ON TREES, UP LOWER LOGGING TRAIL, MONTEVERDE. DEC. 1962. W. JAMES (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B15 AND 63B17C (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-27 (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-10 (R).

BARTRAMIACEAE

- BARTRAMIA POTOSICA Mont. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R).
- BREUTELIA DEFLEXIFOLIA Card. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).
- BREUTELIA JAMAICENSIS (Mitt.) Jaeg. - MONTEVERDE, RIVER WOODS. MAY 1966. M. JAMES (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).
- BREUTELIA SUBARCUATA (C. Mull.) Schimp. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).
- BREUTELIA TOMENTOSA (Brid.) Schimp. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R); PARAMO DE MADRESELVA, 3000 M ELEV., EPIPHYTIC. 1969. GOMEZ 2109 (R).

BARTRAMIACEAE

PHILONOTIS LONGISETA (MICHX.) E.G.BRITT. - CERRO BUVIS, RAIN PARAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2115 (R).

ORTHOTRICHACEAE

MACROMITRIUM CIRRHOSUM (HEDW.) BRID. - MONTEVERDE, WOODS. FEB. 1963. W.JAMES 63B44 (R); WOODS, OCT. 22, 1963. W.JAMES (R); PASTURE, ON TREES. JAN. 15, 1965. W.JAMES 36 (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W.JAMES 68-2 (R); MONTEVERDE, FORESTS ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-79 (R) AND 1969-85 (US).

MACROMITRIUM FUSCO-AUREUM BARTR. - MONTEVERDE, CHECO TRAIL NEAR ADONO CLEARING. AUG. 3, 1968. W.JAMES (R;US).

MACROMITRIUM LONGIFOLIUM (HOOK.) BRID. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R).

MACROMITRIUM SUBCIRRHOSUM C.MÜLL. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W.JAMES 1969-39 (US).

GROUTIELLA APICULATA (HOOK.) CRUM & STEERE - PROV. CARTAGO, ON TREES, 1400 M ELEV., DULCE NOMBRE. FEB. 24, 1924. P.C.STANDLEY (R).

GROUTIELLA WAGNERIANA (C.MÜLL.) CRUM & STEERE - MONTEVERDE, PASTURES, ON TREES. JAN. 17, 1965. M.JAMES 37 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B36 (R); MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-78 (R).

RHACOPILACEAE

RHACOPILUM TOMENTOSUM (HEDW.) BRID. - MONTEVERDE, RECENT CLEARING. JAN. 9, 1965. W.JAMES 15B, 19B, 20 (R); ON ROCKS, MONTEVERDE. MAR. 10-17, 1965. W. & M.JAMES 104A (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 2, WITH MACROLEJEUNEA LANCIFOLIA (ST.) HERZ. (R).

PRIONODONTACEAE

PRIONODON DENSUS (HEDW.) C.MÜLL. - MONTEVERDE, ON ROCKS IN TRAIL TO SPRING. MAR. 10-17, 1965. W. & M.JAMES 103 (R); JUNGLE FOREST, NEAR MONTEVERDE. JUNE 1962. W.JAMES (R); WOODS NEAR MONTEVERDE. FEB. 1963. W.JAMES 63B5, WITH SQUAMIDIUM NIGRESCENS. (R).

PRIONODON DICHOTOMUS HAMPE - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M.JAMES 13 (R).

PTEROBRYACEAE

PIRELLA MARIAE (CARD.) CARD. - MONTEVERDE, DEEP WOODS. JAN. 10, 1965. M.JAMES 24A; ALONG PATH TO SPRING, MONTEVERDE. MAR. 10-17, 1965. W. & M.JAMES 48, 57, 63 AND 82 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W.JAMES 3 (R); PASTURE WOODS, MONTEVERDE. MAR. 17, 1965. W. JAMES 23, 24 AND 25 (R).

PTEROBRYACEAE

- PTEROBRYON DENSUM HORNSCH. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); MONTEVERDE, DEEP WOODS. JAN. 10, 1965. M. JAMES 24 (R); MONTEVERDE, PASTURE WOODS ALONG LONG PATH TO SPRING. MAR. 17, 1965. W. & M. JAMES 28 AND 59 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES 1 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B3 (R).

METEORACEAE

- METEOROPSIS RECURVIFOLIA (HORNSCH.) BROTH. - ON TREES, VIC. JALACA FARM, GOLFO DULCE AREA, 100 FT. ELEV., PROV. PUNTARENAS. MAR. 25, 1949. PAUL H. ALLEN (R).
- METEOROPSIS REMOTIFOLIA (C. MULL.) BROTH. - MONTEVERDE, PASTURE WOODS AND ALONG PATH TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 18 AND 64. (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-5. (R).
- PAPILLARIA DEPPEI (C. MULL.) JAEG. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); IN PASTURES, ON TREES AND LOGS. JAN. 8, 1965. M. JAMES 8 (R); IN WOODS. FEB. 1963. W. JAMES 63B6 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES 7 (R).
- PAPILLARIA IMPONDEROSA (TAYL.) BROTH. - CLOUD FORESTS OF MONTANA DEL CEDRAL, S OF SAN ANTONIO DE ESCAZU. JAN. 1960, ELEV. 2400 M. C. K. HORICH (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-25 (R); ATLANTIC RAIN FOREST AT TARPANTE, DENSE JUNGLES AT BASE OF NORTHERN CORDILLERA DE TALAMANCA ALONG UPPER HEADWATERS AREA OF RIO REVENTAZON, RIO MACHO, S OF OROSI, ELEV. 1100-1200 M., EPIPHYTIC ON FERN FRONDS. DEC. 1959-JAN. 1960. C. K. HORICH (R).
- PILOTRICHELLA FLEXILIS (HEDW.) AONGSTR. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); JAN. 10, 1968, ALONG PATH TO SPRING. M. JAMES 31B (R); DEC. 1964-JAN. 1965. W. JAMES (R); JAN. 15, 1965. W. JAMES 41B (ON ORANGE AND GRAPEFRUIT LEAVES). (R); ALONG RIVER BANK NEAR MONTEVERDE. MAR. 10-17, 1965. W. JAMES 7 (R); PASTURES ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 1, 2 AND 17 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B19 (R); 63B25 (R;US); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES 9, 11 AND 14 (R); MONTEVERDE ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-75 (R); CEDRAL CREST, 2400 M ELEV., ON LEAVES OF FERNS. APR.-JUNE 1960. C. K. HORICH (R); HEIGHTS OF LA CARPENTIERA, VIC. TRES RIOS, 1300-2000 M ELEV. DEC. 1937. P. H. ALLEN (R); CLOUD FOREST BETWEEN CERRO ZURQUI AND CASAJAL, AND BETWEEN SAN GERONIMO DE MORAVIA AND THE CONTINENTAL DIVIDE OF EL ALTO DE LA PALMA, EPIPHYTIC, ELEV. 1400-1550 M. NOV. 1958-JAN. 1960. C. K. HORICH (R); CLOUD FOREST OF MONTANA DEL CEDRAL, S OF SAN ANTONIO DE ESCAZU. JAN. 1960, ELEV. 2000-2440 M. C. K. HORICH (R); ON TREE, YERBA BUENA, N OF SAN ISIDORO, PROV. HEREDIA, 2000 M ELEV. FEB. 22-28, 1926. STANDLEY & VALERIO (R); ON TREE, CERRO DE LAS CARICIAS, N OF SAN ISIDORO, PROV. HEDERIA, ELEV. 2000-2400 M. MAR. 11, 1926. STANDLEY & VALERIO (R).

METEORACEAE

PILOTRICHELLA PENTASTICHA (BRID.) WIJK & MARG. - MONTEVERDE, DEC. 1964-JAN. 1965. W. JAMES (R); OCT. 1963. W. JAMES (R); ALONG PATH TO SPRING AND IN PASTURE WOODS, MONTEVERDE. MAR. 10-17, 1965. W. JAMES 31, 49, 58 AND 60 (R); PASTURES ON TREES AND LOGS, MONTEVERDE. JAN. 9, 1965. M. JAMES 11 (R); MONTEVERDE, FORESTS. OCT. 1967. W. JAMES (R); MONTEVERDE, FORESTS ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-72 (R).

SQUAMIDIUM NIGRICANS (HOOK.) BROTH. - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63B5, WITH PRIONODON DENSUS (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES (R).

PHYLLOGONIACEAE

PHYLLOGONIUM FULGENS (HEDW.) BRID. - MONTEVERDE, ALONG PATH TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 79 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES 12 (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-18 (R); MONTEVERDE, FORESTS ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-103 (R).

PHYLLOGONIUM VISCOSUM (P. BEAUV.) MITT. - MONTEVERDE, PASTURE WOODS. MAR. 10-17, 1965. W. & M. JAMES 36 (R); WOODS NEAR MONTEVERDE. FEB. 1962. W. JAMES 63B7 (R); JUNGLE FORESTS NEAR MONTEVERDE. JUNE 1962. W. JAMES 8 (R).

NECKERACEAE

CALYPTOTHECIUM TURGESCENTS BROTH. & THER. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES 5 AND 16 (R).

HOMALIA GLABELLA (HEDW.) B.S.G. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); JUNGLE FOREST. JUNE 1962. W. JAMES (R); ALONG RIVER BANK NEAR MONTEVERDE. MAR. 10, 1965. W. JAMES 9 (R); SAME LOC., MAR. 17, 1965. W. JAMES 5 (R); ALONG PATH TO SPRING. MAR. 10, 1965. W. JAMES 61 AND 75 (R); ON ROCK BY SPRING. MAR. 11, 1965. M. JAMES 16A (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-28 (R).

POROTRICHUM COBANENSE C. MÜLL. - MONTEVERDE, ON ROCK BY SPRING. MAR. 11, 1965. M. JAMES 16 AND 101 (R); EPIPHYTIC ON FERNS, SHORE AREA OF RIO VIRILLA, NEAR LA URUCA, A SUBURB OF SAN JOSE, ELEV. 1000 M. JAN. 1950. C. K. HORICH (R); ATLANTIC RAIN FOREST OF TAPANTI, DENSE JUNGLES AT BASE OF NORTHERN CORDILLERA DE TACAMANCA, ALONG UPPER HEADWATER AREA OF RIO REVENTAZON AND RIO MAGHO, S OF OROSI, ELEV. 1100-1200 M, EPIPHYTIC ON FERN FRONDS. DEC. 1959-JAN. 1960. C. K. HORICH (R).

POROTRICHUM LONGIROSTRE (HOOK.) MITT. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); ALONG PATH TO SPRING, MONTEVERDE. JAN. 1, 1965. M. JAMES 32B (R); PASTURE WOODS, MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 29, 32, 33, 40A, 81, 99 AND 27B (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES (R); ALONG RIVER BANK, MONTEVERDE. MAR. 17, 1965. W. & M. JAMES 15 (R).

NECKERACEAE

POROTRICHUM NECKERAEFORME (HAMPE) MITT. - MONTEVERDE, ON TREES IN FOREST NEAR MOTAS. APR. 4, 1969. W.JAMES 1969-90 (US).

PILOTRICHACEAE

PILOTRICHUM ASPERIFOLIUM MITT. - MONTEVERDE, DEEP WOODS, ALONG PATH TO SPRING. JAN. 10, 1965. M.JAMES 35 (R); ON ROCKS ON TRAIL TO SPRING. MAR. 10-11, 1965. W. & M.JAMES 83 AND 97 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W.JAMES 63B18, WITH OMPHALANTHUS FILIFORMIS AND 63B21 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES 19 (R).

PILOTRICHUM RAMOSISSIMUM MITT. - MONTEVERDE, ON TREES IN FOREST NEAR MOTAS. APR. 4, 1969. W.JAMES 1969-93 (US).

HYPOPTERYGIACEAE

HYPOPTERYGIUM TAMARISCINUM (HEDW.) BRID. - MONTEVERDE, WOODS. OCT. 22, 1963. W.JAMES (R); WOODS, MONTEVERDE. FEB. 1963. W.JAMES 63B43 (R); MONTEVERDE, ALONG PATH TO SPRING. MAR. 10, 1965. W. & M. JAMES 62 (R); RIVER WOODS NEAR MONTEVERDE. MAY 1966. M.JAMES (R).

LESKEACEAE (THUIDIACEAE)

THUIDIUM ANTILLARUM BESCH. - MONTEVERDE, RECENT CLEARING. JAN. 9, 1965. W. JAMES 23B, 15A, 21 AND 19A (R); ALONG RIVER BANK, MONTEVERDE. MAR. 10-17, 1965. W. & M.JAMES 10 AND 13 (R); ALONG PATH TO SPRING, MONTEVERDE. MAR. 10-17, 1965. W. & M.JAMES 65, 43, 41 AND 86 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W.JAMES 63B20 (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W.JAMES 68-24.

THUIDIUM ERECTUM DUB. - MONTEVERDE, WOODS. FEB. 1963. W.JAMES 63B40, 63B39 AND 63B37 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W.JAMES (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY NEAR HIGHEST PART. MAR. 1963. W.JAMES (R); WOODS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W.JAMES 68-23 (R).

AS INDICATED IN INDEX MUSCORUM (W.M.&F., 1969) THE COMBINATION I. DELICATULUM (HEDW.) MITT. IS INVALID, BEING A LATER HOMONYM OF I. DELICATULUM (L.) B.S.G. (= I. RECOGNITUM HEDW.). THE TAXON WARRANTS MORE THAN THE VARIETAL STATUS UNDER I. RECOGNITUM GIVEN IN THE INDEX. A SEARCH INDICATES THUIDIUM ERECTUM DUB. (1878) AS THE OLDEST AVAILABLE NAME. THERE IS A SLIGHT CHANCE AN OLDER NAME WILL BE FOUND THAT IS NOT PRESENTLY RECOGNIZED AS A SYNONYM.

THUIDIUM MINUTULUM (HEDW.) B.S.G. - MONTEVERDE, PASTURE WOODS. MAR. 17, 1965. W.JAMES 20 (R); CLOUD FORESTS OF MONTANA DEL CERDAL, S OF SAN ANTONIO DE ESCAZU, ELEV. 2000-2400 M ELEV. JAN. 1960. C.K.HORICH (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-17 (R).

LESKEACEAE (THUIDIACEAE)

THUIDIUM PHILIBERTII LIMPR. - MONTEVERDE, WOODS. OCT. 22, 1963 W. JAMES (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R).

BRACHYTHECIACEAE

BRACHYTHECIUM FLEXIVENTROSUM (C. MÜLL.) JAEG. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).

HOMALOTHECIUM LESKEOIDES (HOOK.) H. ROBINSON. (SYN.: PALAMOCADIUM LESKEOIDES (HOOK.) E. G. BRITT.) - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63826 (R).

RYNCHOSTEGIUM SERRULATUM (HEDW.) JAEG. - MONTEVERDE, WOODS ALONG PATH TO SPRING. MAR. 10, 1965. W. JAMES 468, WITH METEORIOPSIS REMOTIFOLIA. (R).

PLAGIOTHECIACEAE

PLAGIOTHECIUM DENTICULATUM (HEDW.) B. S. G. - TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST PART. MAR. 1963. W. JAMES (R).

HOOKERIAACEAE

ADELOTHECIUM BOGOTENSIS (HAMPE) MITT. - MONTEVERDE, PASTURE WOODS. MAR. 17, 1965. W. & M. JAMES 30 (R).

CALLICOSTELLA PALLIDA (HORNSCH.) JAEG. - MONTEVERDE, ALONG PATH TO SPRING. MAR. 10, 1965. W. & M. JAMES 53 AND 68 (R).

CROSSMITRIUM PATRISIAE (BRID.) C. MÜLL. - MONTEVERDE, ON FRONDS OF BOLBITIS ALIENIA VAR., ALONG RIVER BANKS. JAN. 12, 1968. W. JAMES (R).

CYCLODICTYON ALBICANS (HEDW.) O. KUNTZE - MONTEVERDE, ON ROCKS IN TRAIL TO SPRING. MAR. 11, 1965. M. JAMES 102 (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-6 (R).

CYCLODICTYON JAMESII H. ROBINSON - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-44 (R;US).

HEMIRAGIS AUREA (BRID.) BESCH. (SYN.: HARPOPHYLLUM AUREUM (P. BEAUV.) SPRUCE). - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES 17 (R).

HOOKERIA ACUTIFOLIA HOOK. ET GREV. - MONTEVERDE, CHECO TRAIL NEAR ADONO CLEARING. AUG. 3, 1968. W. JAMES (R;US).

HOOKERIOPSIS CRISPA (C. MÜLL.) JAEG. - MONTEVERDE, CHECO TRAIL NEAR ADONO CLEARING. AUG. 3, 1968. W. JAMES (R); CERRO VUELTAS, 3000 M ELEV., RAIN PARAMO, EPILITHIC. 1969. GOMEZ 2118 (R).

HOOKERIOPSIS FALCATA (HOOK.) JAEG. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-26 (US).

HOOKERIACEAE

HOOKERIOPSIS SUBFALCATA (HAMPE) JAEG. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-18A (US).

ISODREPANIUM LENTULUM (WILS.) E.G. BRITT. - MONTEVERDE, ALONG PATH TO SPRING. MAR. 10, 1965. W. & M. JAMES 54 (R); MONTEVERDE, ALONG RIVER BANK. MAR. 17, 1965. W. & M. JAMES 3 AND 11 (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES 63B33 (R); CERRO BUVIS, RAIN RAMO, 3000-3150 M ELEV., EPIPHYTIC. 1969. GOMEZ 2112B (R).

LEPIDOPILIDIUM PORTORICENSE (C. MULL.) CRUM ET STEERE - MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-80 (US).

LEPIDOPILUM BREVICEPS MITT. - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M. JAMES 18 AND 20 (R).

LEPIDOPILUM HAPLOCILIATUM (C. MULL.) PAR. - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M. JAMES 15 (R).

LEPIDOPILUM RADICALE MITT. - MONTEVERDE, ON TRAIL TO FIRAROLA'S. MAR. 10, 1965. W. & M. JAMES 92 (R); WOODS, MONTEVERDE. OCT. 22, 1963. W. JAMES 16 (R).

NEOHYPNELLA DIVERSIFOLIA (MITT.) WELCH ET CRUM - MONTEVERDE, FORESTS ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-108 (R).

RHYNCHOSTEGIOPSIS FLEXUOSA (SULL.) C. MULL. - MONTEVERDE, ON TREES ALONG GUACIMAL RIVER. JAN. 1968. W. JAMES 68-7 AND 68-11 (R).

SEMATOPHYLLACEAE

GLOSSADELPHUS TRUNCULATUS (C. MULL.) FLEISCH. (SYN.: HYPNELLA JAMESII H. ROBINSON, BRYOLOGIST, 68: 333, F. 10-12. 1965). - MONTEVERDE, DEEP WOODS ALONG PATH TO SPRING. JAN. 10, 1965. M. JAMES 32C (HOLOTYPE OF HYPNELLA JAMESII H. ROBINSON IN US; ISOTYPE IN R).

SEMATOPHYLLUM CAESPITOSUM (HEDW.) MITT. - MONTEVERDE, ALONG PATH TO SPRING. MAR. 10, 1965. W. JAMES 45 (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES (R).

SEMATOPHYLLUM CUSPIDATUM MITT. (MAY PROVE TO BE S. AFFINE (HORNSCH.) MITT., WHICH IS THE OLDER NAME. - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M. JAMES 17 (R).

SEMATOPHYLLUM INSULARUM (SULL.) BARTR. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-24 (R).

SEMATOPHYLLUM LINDIGII (HAMPE) MITT. - MONTEVERDE, WOODS. FEB. 1963. W. JAMES 63B1, 63B9 AND 63B34 (R).

SEMATOPHYLLUM SERICIFOLIUM MITT. - MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R).

TAXITHELIUM PLANUM (BRID.) MITT. - MONTEVERDE, PASTURE WOODS. MAR. 10-17, 1965. W. & M. JAMES 34A (R); JUNGLE FOREST NEAR MONTEVERDE. JUNE 1962. W. JAMES (R).

HYPNACEAE

CTENIDIUM MALACODES MITT.-BRILLANTE, ON FERN RHIZOME. JULY 25, 1966. W. JAMES (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-27 (R;US).

ECTROPOTHECIUM APICULATUM (HORNSCH.) MITT. - MONTEVERDE, RECENT CLEARING. JAN. 9, 1965. W. JAMES 13 AND 16 (R); ON ROCKS IN PASTURE, MONTEVERDE. MAR. 10, 1965. W. & M. JAMES 98 (R).

HYPNUM AMABILE (MITT.) HAMPE - CLOUD FOREST OF MONTANA DEL CEDRAL, S OF SAN ANTONIO DE ESCAZU, ELEV. 2000-2400 M. JAN. 1960. C.K. HORICH (R).

HYPNUM MIRABILE BARTR. - MONTEVERDE, PASTURES, ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 5 (R).

HYPNUM POLYPTERUM (MITT.) BROTH. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); PASTURE WOODS. MAR. 17, 1965. W. & M. JAMES 95 (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US); MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-86 (US) AND 1969-71 (US).

ISOPTERYGIUM DIMINUTIVUM BARTR. - MONTEVERDE, ON TREES ALONG GUACIMAL RIVER. JAN. 1968. W. JAMES 68-19 (R).

MITTENOTHAMNIUM DIMINUTIVUM (HAMPE) E.G. BRITT. - BRILLANTE. JULY 25, 1966. W. JAMES, WITH LOPHOGOLEA COLUMBICA GOTT. (?). (R); MONTEVERDE, JUNGLE FOREST. JUNE 1962. W. JAMES (R); WOODS NEAR MONTEVERDE. FEB. 1963. W. JAMES (R); CLOUD FORESTS OF MONTANA DEL CEDRAL, S OF SAN ANTONIO DE ESCAZU, ELEV. 2000-2400 M. JAN. 1960. C.K. HORICH (R).

MITTENOTHAMNIUM LANGSDORFFII (HOOK.) CARD. - MONTEVERDE, WOODS. OCT. 22, 1963. W. JAMES (R); FEB. 1963. W. JAMES 63B41 (R); TREELESS WINDY MOUNTAIN TOP, PAN AMERICAN HIGHWAY, NEAR HIGHEST POINT. MAR. 1963. W. JAMES (R;US).

MITTENOTHAMNIUM LEHMANNII (BESCH.) CARD. - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M. JAMES 21 (R); ON TREES AND ROCKS ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-1 AND 68-8 (R).

MITTENOTHAMNIUM MINUSCULIFOLIUM (C. MÜLL.) CARD. - MONTEVERDE, WOODS ALONG PATH TO SPRING. MAR. 10-17, 1965. W. & M. JAMES 2, 6, 14, 19, 22, 39, 41B, 50C, 52, 55, 53B, 73, 74 AND 87A. (R); ON TREES ALONG GUACIMAL RIVER, MONTEVERDE. JAN. 1968. W. JAMES 68-20 (R).

MITTENOTHAMNIUM REPTANS (HEDW.) CARD. - MONTEVERDE, MOUNTAIN TOP ALONG TRAIL. DEC. 29, 1964. JERRY JAMES 28 (R); DEEP WOODS ALONG PATH TO SPRING. JAN. 10, 1965. M. JAMES 32A AND 34 (R); RECENT CLEARING, MONTEVERDE. JAN. 9, 1965. W. JAMES 18 AND 23A (R).

PUIGGARIELLA AURIFOLIA (MITT.) BROTH. - MONTEVERDE, PASTURES, ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 12 (R); SAME LOC., DEC. 1964. W. JAMES 4 (R).

HEPATICAEE

ANTHOCROTACEAE

DENDROCEROS CRISTATUS (Hook.) NEES - MONTEVERDE, ON TREE IN YARD.
JUNE 14, 1966. M. JAMES 3 (R). DET. PROSKAUER.

HERBERTACEAE

HERBERTA PENSILIS (T. TAYLOR) SPRUCE - MONTEVERDE, CHECO TRAIL NEAR
ADONO CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORESTS,
4300 FT. ELEV. FEB. 1969. W. JAMES 1969-14 (US).

LEPICOLEACEAE

LEPICOLEA PRUINOSA (T. TAYLOR) SPRUCE - MONTEVERDE, CHECO TRAIL NEAR
ADONO CLEARING. AUG. 3, 1968. W. JAMES (R).

TRICHOCOLEACEAE

TRICHOCOLEA FLACCIDA (SPRUCE) JACK ET STEPH. - MONTEVERDE, FORESTS,
4300 FT. ELEV. FEB. 1969. W. JAMES 1969-1 (R).

TRICHOCOLEA TOMENTOSA (SWARTZ) GOTTSCHKE - MONTEVERDE, CHECO TRAIL
NEAR ADONO CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORE-
EST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-109 (R).

LEPIDOZIAACEAE

BAZZANIA BREUTELIANA (LINDENB. ET GOTT.) TREVIS. - MONTEVERDE, MOUN-
TAIN TOP ALONG TRAIL. DEC. 29, 1964. JERRY JAMES 27 (R); MONTE-
VERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-28 (R).

BAZZANIA DENTICULATA (LINDENB. ET GOTT.) TREVIS. - MONTEVERDE, FOR-
ESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-33B AND 1969-34 (R).

BAZZANIA HOOKERI (LINDENB.) TREVIS. - MONTEVERDE, FORESTS, 4300 FT.
ELEV. FEB. 1969. W. JAMES 1969-32 (US).

BAZZANIA RORAIMENSIS (STEPH.) FULFORD - MONTEVERDE, FORESTS, 4300 FT.
ELEV. FEB. 1969. W. JAMES 1969-29 (R).

BAZZANIA STOLONIFERA (SWARTZ) TREVIS. - MONTEVERDE, FORESTS, 4300 FT.
ELEV. FEB. 1969. W. JAMES 1969-8 AND 1969-25 (R).

LEPIDOZIA ARMATA STEPH. - MONTEVERDE, CHECO TRAIL NEAR ADONO CLEARING.
AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORESTS, 4300 FT. ELEV.
FEB. 1969. W. JAMES 1969-31 AND 1969-107 (R); CERRO VUELTAS, 3000
M ELEV., RAIN PARAMO, EPILITHIC. 1969. GOMEZ 2117 (R).

LEPIDOZIA BRASILIENSIS STEPH. - MONTEVERDE, FORESTS, 4300 FT. ELEV.
FEB. 1969. W. JAMES 1969-33A (US).

LEPIDOZIA PATENS LINDENB. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB.
1969. W. JAMES 1969-12 (US).

ACROBOLACEAE

TYLIMANTHUS JAMAICENSIS STEPH. - MONTEVERDE, FORESTS, 4300 FT. ELEV.
FEB. 1969. W. JAMES 1969-36 (US).

LOPHOCOLEACEAE

CHILOSCYPHUS COMBINATUS (NEES) NEES - MONTEVERDE, CHECO TRAIL NEAR
ADONO CLEARING. AUG. 3, 1968. W. JAMES (R;US).

LEPTOSCYPHUS LIEBMANNIANUS (LINDENB. ET GOTT.) MITT. - MONTEVERDE,
FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-11 (R);
BRILLANTE, ON FERN RHIZOME. JULY 25, 1966. W. JAMES (R).

LOPHOGOLEA COLUMBICA GOTTSCHKE - BRILLANTE. JULY 25, 1966. W. JAMES (R).

LOPHOGOLEA MARTIANA NEES - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES
76, 77, 87B (R).

LOPHOGOLEA MURICATA (LEHM.) NEES - MONTEVERDE. MAR. 10-17, 1965.
W. & M. JAMES 50B (R).

SCAPANIACEAE

SCAPANIA PORTORICENSIS HAMPE ET GOTTSCHKE - BRILLANTE. JULY 25, 1966.
W. JAMES (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W.
JAMES 1969-7 (US).

CEPHALOZIACEAE

CEPHALOZIA CARIBBEANIA FULFORD - MONTEVERDE, FORESTS, 4300 FT. ELEV.
FEB. 1969. W. JAMES 1969-2 (US).

ODONTOSCHISMA LONGIFLORUM (TAYLOR) STEPH. - MONTEVERDE, FORESTS,
4300 FT. ELEV. FEB. 1969. W. JAMES 1969-19A (US).

PLAGIOCHILACEAE

PLAGIOCHILA ACANTHODA LINDENB. ET GOTTSCHKE - MONTEVERDE, MAR. 10-17,
1965. W. & M. JAMES 70 (R).

PLAGIOCHILA BURSATA (DESV.) LINDENB. - BRILLANTE, ON FERN RHIZOMES.
JULY 25, 1966. W. JAMES (R); MONTEVERDE, CHECO TRAIL NEAR ADONO
CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORESTS, 4300
FT. ELEV. FEB. 1969. W. JAMES 1969-22 (R).

PLAGIOCHILA CHINANTLANA GOTTSCHKE - MONTEVERDE, ON ROCKS BY WATER.
JUNE 10, 1966. M. JAMES 14 (R).

PLAGIOCHILA CONTINGENS GOTTSCHKE - MONTEVERDE, CHECO TRAIL NEAR ADONO
CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, ON TREES IN
FOREST NEAR MOTAS. APR. 4, 1969. W. JAMES 1969-94 (MALE, US)
AND 1969-89 (FEMALE, US).

PLAGIOCHILA CRISTATA (SW.) DUM. - MONTEVERDE, MAR. 10-17, 1965.
W. & M. JAMES 26 AND 35 (R); MONTEVERDE, CHECO TRAIL NEAR ADONO
CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORESTS ALONG
SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-110 (R).

PLAGIOCHILACEAE

PLAGIOCHILA DEMISSE GOTTSCHKE - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 42A (R).

PLAGIOCHILA LUDOVICIANA SULL. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 38, 40B AND 89 (WITH RADULA COMPLANATA) (R).

PLAGIOCHILA ORESITROPHA SPRUCE - MONTEVERDE, RIVER WOODS. MAY 1966. M. JAMES (R).

PLAGIOCHILA RUTILANS LINDENB. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 80 (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-4 (R).

PLAGIOCHILA STANDLEYI HERZ. - MONTEVERDE, RIVER WOODS. MAY 1966. M. JAMES (R).

PLAGIOCHILA VERRUCULOSA SCHUSTER - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-18B AND 1969-9 (R;US).

RADULACEAE

RADULA COMPLANATA (L.) DUM. - MONTEVERDE, PASTURES, ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 7 (R); MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 47, 77 (WITH LOPHOCOLEA MARTIANA), 89 (R).

RADULA ELEGANS STEPH. - MONTEVERDE, FORESTS. OCT. 1967. W. JAMES (R;US).

PORELLACEAE

PORELLA LIEBMANNIANA (LINDENB. ET GOTTSCHKE) TREVIS. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 71 (R).

PORELLA SWARTZIANA (WEB.) TREVIS. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 42B AND 72 (R); MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-83 (R).

FRULLANIACEAE

FRULLANIA ARECAE (SPRENG.) SPRUCE - MONTEVERDE. OCT. 1963. W. JAMES 14 (R); MONTEVERDE, FORESTS. MAR. 10-17, 1965. W. & M. JAMES 88, 105, WITH EUOSMOLEJEUNEA DURIUSCULA. (R).

FRULLANIA ATRATA NEES - MONTEVERDE. OCT. 1963. W. JAMES 17 (R).

FRULLANIA BRASILIENSIS RADDI - MONTEVERDE. OCT. 1963. W. JAMES 15 (R).

FRULLANIA CUCULLATA LINDENB. ET GOTTSCHKE - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-17 (R).

FRULLANIA MIRABILIS JACK ET STEPH. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 106 (R).

FRULLANIA OSCULATIANA DeNOT. - MONTEVERDE, ON TREES, FOREST NEAR MOTAS. APR. 4, 1969. W. JAMES 1969-91 (R;US).

LEJEUNEACEAE

- ARCHILEJEUNEA LEPRIEURII (MONT.) SPRUCE - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 100 (R).
- BRYOPTERIS FRUTICOLOSA TAYL. - MONTEVERDE, MOUNTAIN TOP ALONG TRAIL. DEC. 29, 1964. JERRY JAMES 28 (R) AND 33 (US); MONTEVERDE, WOODS. FEB. 1963. W. JAMES (US).
- BRYOPTERIS TRINITENSIS (LEHM. & LINDENB.) LEHM. ET LINDENB. - MONTEVERDE, ON ROCKS BY WATER. JUNE 10, 1966. M. JAMES 16 (R).
- CERATOLEJEUNEA MARITIMA (SPRUCE) STEPH. - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-13 (R).
- CERATOLEJEUNEA CORNUTA (LINDENB.) SCHIFFN. - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40E (R); ALONG PATH TO SPRING, MONTEVERDE. JAN. 10, 1965. M. JAMES 31A (R).
- COLOLEJEUNEA SCABRIFLORA GOTTSCHKE EX STEPH. - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 41A (R).
- COLURA TENUICORNIS (EVANS) STEPH. - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40F (R).
- DIPLASIOLEJEUNEA BRACHYCLADA EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40C, 40H, 41C (R).
- DREPANOLEJEUNEA BIOCELLATA EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40I AND 41A (R).
- EUOSMOLEJEUNEA CLAUSA (NEES ET MONT.) EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 41D (R); MONTEVERDE, FORESTS ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-102 (R).
- EUOSMOLEJEUNEA DURIUSCULA (NEES) EVANS - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 105, WITH FRULLANIA ARECAE (R).
- HYGROLEJEUNEA CERINA (LEHM. ET LINDENB.) STEPH. - MONTEVERDE, PASTURES, ON TREES AND LOGS. JAN. 9, 1965. W. JAMES 10 (R).
- HYGROLEJEUNEA PUNCTATA HERZ. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 76, WITH LOPHOCOLEA MARTIANA (R).
- LEUCOLEJEUNEA XANTHOCARPA (LEHM. ET LINDENB.) EVANS - MONTEVERDE, OCT. 1963. W. JAMES 13 (R).
- MACROLEJEUNEA LANCIFOLIA (STEPH.) HERZ. - MONTEVERDE, PASTURES, ON TREES AND LOGS. JAN. 9, 1965. M. JAMES 14 (R).
- NOWELLIA REEDII H. ROBINSON - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-42 (HOLOTYPE: US; ISOTYPE: REED).
- ODONTOLEJEUNEA LUNULATA (WEB.) SCHIFFN. - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40A (R).
- OMPHALANTHUS FILIFORMIS (SW.) NEES - MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-67 AND 1969-73 (R); MONTEVERDE, MOUNTAIN TOP ALONG TRAIL. DEC. 29, 1964. JERRY JAMES 30 (R); MONTEVERDE. OCT. 1963. W. JAMES 9 (R).

LEJEUNEACEAE

- PELTOLEJEUNEA OVALIS (LINDENB. ET GOTTSCHKE) SPRUCE - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40D (R).
- PRIONOLEJEUNEA MUCRONATA (LAC.) STEPH. - MONTEVERDE. MAR. 10-17, 1965. W. & M. JAMES 34B, 50A, 69, 108 (ON PILOTRICHELLA IMBRICATA) (R); ALONG PATH TO SPRING, MONTEVERDE. JAN. 10, 1965. M. JAMES 34 (R).
- RECTOLEJEUNEA MAXONII EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 41B(1), 41A AND 41E (R).
- STICTOLEJEUNEA KUNZEANA (GOTTSCHKE) SCHIFFN. - MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-66 (US).
- STICTOLEJEUNEA SQUAMATA (WILLD.) SCHIFFN. - MONTEVERDE, WOODS. OCT. 1967. W. JAMES (R;US).
- TAXILEJEUNEA OBTUSANGULA (SPRUCE) EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40G AND 41A (R).
- TAXILEJEUNEA PTEROGONIA (LEHM. ET LINDENB.) STEPH. - MONTEVERDE, UNDER EAVES OF GREENHOUSE. JAN. 11, 1965. M. JAMES 29 (R); MONTEVERDE, FOREST ALONG SOUTH LINE. MAR. 16, 1969. W. JAMES 1969-70.
- TRACHYLEJEUNEA INFLEXA (HAMPE) STEPH. - MONTEVERDE, ON TREES IN FOREST NEAR MOTAS. APR. 4, 1969. W. JAMES 1969-100 (R).

DILAENACEAE

- SYMPHYOGYNA BRONGNIARTII MONT. - MONTEVERDE, ROAD BANK. MAY 29, 1966. W. JAMES 27 (R).

METZGERIACEAE

- METZGERIA CONJUGATA LINDENB. - MONTEVERDE. OCT. 1963. W. JAMES 7 (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-15.
- METZGERIA FRUTICULOSA (DICKS.) EVANS - MONTEVERDE, ON LEAVES OF ORANGE AND GRAPEFRUIT. JAN. 15, 1965. W. JAMES 40B(2) (R).
- METZGERIA HAMATA LINDB. - MONTEVERDE, CHECO TRAIL NEAR ADONO CLEARING. AUG. 3, 1968. W. JAMES (R); MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-19B (R).

ANEURACEAE

- RICCARDIA MULTIFIDA (L.) S.F. GRAY - MONTEVERDE, FORESTS, 4300 FT. ELEV. FEB. 1969. W. JAMES 1969-3 (R).

MONOCLEACEAE

- MONOCLEA GOTTSCHKEI LINDB. - MONTEVERDE, ON TREE, RIVER WOODS. JUNE 7, 1966. M. JAMES 9 (R).

MARCHANTIACEAE

- DUMORTIERIA HIRSUTA (SW.) NEES - MONTEVERDE, EATONS PATH, RIVER CLIFF, 4500 FT. ELEV. MAR. 9, 1969. W. JAMES 1969-88 (R).
- MARCHANTIA CHENOPODA L. - MONTEVERDE, ROAD BANK. MAY 29, 1966. W. JAMES 23, 24, 25, 26 (R); ON GROUND ALONG RIVER, WOODS, MONTEVERDE. JUNE 7, 1966. M. JAMES 7 (R); ON PASTURE LOG, MONTEVERDE. JUNE 13, 1966. M. JAMES 2 (R).

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXXIII.

THE GENUS GYPTIS

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Gyptis of Cassini is the oldest name for a group of plants which have often mistakenly been placed in the genus Conoclinium. These plants which occur in Brazil and adjacent areas have flat receptacles, 4-26 flowers per head, thick densely setose achenes, very prominent papillae on the inside and outside surface of the corolla lobes and many hairs on the outside surface of the corolla lobes. The plants with their rather long scapose inflorescences, compact clusters of heads and often bluish or lavender flowers do resemble Conoclinium (King & Robinson, 1970) and the related Brazilian genus, Barrosoa (King & Robinson, 1971a). These three genera along with Lourteigia (1971b) of the northern Andes, share papillose outer surfaces of the corolla and highly ornamented walls of the anther collar cells. There is every reason to place them together in a group which we would refer to as Gyptoid. Only striking differences in pappus structure and slight differences in carpodium structure separate the related group which we refer to as Ageratoid.

One feature of the achene of Gyptis may be more the result of its shape than of relationship. The achenes are very broad and the minute punctations on the lateral surfaces are usually arranged in prominent transverse rows. Similar rows of punctations have been observed in other groups such as Disynaphia which are not considered closely related.

In G. artemisifolia, we have seen a few papillae on the base of the style which might suggest some relationship to the Eupatorioids. Distinctions between the groups are clear, however. One species often associated with Gyptis, Eupatorium oblongifolium Sch.-Bip. ex Baker is definitely a Stomatanthes (Robinson, 1970) in the Eupatorioid series having non-papillose corolla lobes and occasional stomates.

Gyptis (Cassini) Cassini, Dict. Sci. Nat. 16: 10. 1820.

Perennial herbs usually with tuberous tap roots. Stems erect, sparingly branched. Leaves opposite often becoming alternate above, ovate to bipinnatifid, serrulate to deeply cleft. Inflorescence usually densely corymbose or cymose. Involucre of 16-25 lanceolate to linear truncate scales in 2-3 series; receptacle flat, glabrous. Head with 4-26 flowers, corollas narrowly funnelform, strongly papillose on both surfaces of lobes, hairs and often glands on outer surface of lobes,

cells of tube narrow with sinuous walls; anther collar with mostly quadrate or short rectangular cells below, walls with transverse or oblique thickened bands. Anther appendages elongate with rather large cells; style base not enlarged, style appendages with distinct usually pointed papillae, appendages sometimes slightly enlarged; achenes prismatic, 5-costate, costae and lateral surfaces densely setiferous, minute punctations in rather regular transverse bands. Carpopodia very short, of very quadrate rather thin-walled cells. Pappus of many setae, apical cells of setae usually subacute or pointed.

Type species: Gyptis pinnatifida Cassini

Chromosome number not determined.

Key to species of Gyptis

1. Style branches with rather broad short-papillose appendages
G. commersonii
1. Style branches slender with pointed long papillae.
 2. Leaves pinnately-bipinnately dissected.
 3. Plants with few or no branches above the base, inflorescence usually of one or a few rather dense corymbs or cymes
G. pinnatifida
 3. Plants with many axillary branches, inflorescence rather diffuse
G. artemisifolia
 2. Leaves ovate with crenate or serrate margins.
 4. Phyllaries with unmodified tips
G. inornata
 4. Phyllaries with densely pubescent and often much broadened tips.
 5. Leaves nearly glabrous, with some short hairs near the margin
G. alternifolia
 5. Leaves densely pubescent.
 6. Leaves with short pubescence, blades elliptical-lanceolate
G. vernoniopsis
 6. Leaves coarsely long-pubescent, blades often rhomboid-ovate
G. lanigera

Our studies indicate that the genus contains the following seven species.

Gyptis alternifolia (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium alternifolium Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 333. 1876. Argentina, Brazil, Paraguay.

Gyptis artemisifolia (Griseb. in Goett.) R.M.King & H.Robinson, comb. nov. Eupatorium artemisifolium Griseb. in Goett. Abh. 24: 171. 1879. Argentina.

Gyptis commersonii Cassini, Dict. Sci. Nat. 20: 178. 1821.

Eupatorium bacleanum A.P.Decandolle, Prodr. 5: 157. 1836.
Argentina, Brazil, Uruguay.

Gyptis inornata R.M.King & H.Robinson, sp. nov.

G. lanigeræ Hook. & Arn. affinis sed involucri squamæ
inornatae

Brazil, Parana: Jaguarihyva, Dusen 14938 Holotype US!
Dusen 11679 US

The simple narrowly acute involucrel bracts are very distinct from all the other species of the genus. In other characters, the species is very close to the forms of G. lanigera having narrowly oblong ovate leaf blades and rather spreading violet colored cymose to corymbose inflorescences.

Gyptis lanigera (Hook. & Arn.) R.M.King & H.Robinson, comb. nov.

Eupatorium lanigerium Hook. & Arn. in Hook., Comp. Bot. Mag.
1: 242. 1835. Argentina, Brazil, Paraguay.

Gyptis pinnatifida Cassini, Dict. Sc. Nat. 20: 178. 1821.

Eupatorium ceratophyllum Hook. & Arn. in Hook., Comp. Bot.
Mag. 1: 240. 1835. Eupatorium tanacetifolium Gill. ex Hook.
& Arn. in Hook., Comp. Bot. Mag. 1: 242. 1835. Eupatorium
erodiifolium A.P.Decandolle, Prodr. 5: 158. 1836. Gyptis
peucedanifolia Schultz-Bip. ex Baker, in Mart., Fl. Bras.
6(2): 333. 1876. Argentina, Brazil, Uruguay.

Gyptis vernoniopsis (Schultz-Bip. ex Baker) R.M.King & H.Robinson,

comb. nov. Eupatorium vernoniopsis Schultz-Bip. ex Baker in
Mart., Fl. Bras. 6(2): 334. 1876. Eupatorium aureoviride
Chod., in Bull. Herb. Boiss. Ser. II (2): 309. 1902.
Argentina, Brazil, Paraguay, Uruguay.

Species excluded

Gyptis baccharoides Schultz-Bip. ex Baker = Symphypappus
viscosus Schultz -Bip. ex Baker.

Gyptis oblongifolia Schultz-Bip. ex Baker = Stomatanthes
oblongifolius (Schultz-Bip. ex Baker) H.Robinson.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB - 20502 to the senior author.

Literature Cited

- King, R. M. & H. Robinson. 1970. Studies in the Eupatorieae (Compositae). XIII. The genus Conoclinium. Phytologia 19: 299-300
- & ———. 1971a. Studies in the Eupatorieae (Compositae). XXXIV. A new genus, Barrosoa. Phytologia 21: 26-27.
- & ———. 1971b. Studies in the Eupatorieae (Compositae). XXXV. A new genus, Lourteigia. Phytologia 21: 28-30.
- Robinson, H. 1970. South American species of Stomatanthes (Eupatorieae, Compositae). Phytologia 20: 334-338.

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXXIV.

A NEW GENUS, BARROSOA

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Among the species that can be roughly sorted into the Gyptoid group in Brazil, there are two very distinctive groups. One, having very broad achenes with many setae and indistinct carpopodia and highly papillose style branches, is true Gyptis. The other group, having more slender achenes with few or no setae, very distinct carpopodia of large cells and rather smooth style branches, is here named as the new genus Barrosoa. The complex has been related to Conoclinium of North America. Barrosoa does have conical receptacles such as are found in Conoclinium, but Gyptis has only flat receptacles.

Barrosoa differs from Conoclinium by the acute tips on its pappus setae, the very prominent carpopodia with large cells, the hairs on the outside of the corolla lobes and the nearly smooth style branches.

The genus is also related to Lourteigia of the northern Andes and one species B. morichalana (Aristeguieta) R.M.King & H.Robinson occurs in both Venezuela and Colombia. This is, however, a plant of low elevations, occurring in llanos in the Orinoco region. Lourteigia is a genus of strictly higher elevations. Lourteigia also differs in the smaller cells of its carpopodium, the less differentiated cells on the inner surface of its corolla lobes and its always flat receptacles.

We take great pleasure in naming this new genus in honor of Dr. Graziela Maciel Barroso, the leading authority on Brazilian Compositae.

Barrosoa R.M.King and H.Robinson, genus novum Compositarum (Eupatorieae). Plantae suffrutescentes paucae ramosae minute pubescentes. Folia opposita vel superne alterna lanceolata serrata vel crenulata distincte breviter petiolata. Inflorescentiae dense corymbosae. Involucri squamae ca 15-25 subaequilongae 2-seriatae angustelanceolatae subimbricatae; receptacula convexa vel conica glabra. Flores 20-55 in capitulo; corollae infundibulares, tubis laevibus, cellulis angustis, parietibus sinuosis, lobis utrinque valde papillosis extus setiferis et glanduliferis, cellulis interioribus brevibus ab inferioribus valde distinctis; filamenta antherarum in parte superiore elongata, cellulis plerumque breviter rectangularibus brevioribus, parietibus dense transverse vel oblique ornatis, cellulis exothecialibus plerumque subquadratis vel brevioribus, appendicibus antherarum late ovatis oblongis; styli inferne non nodulosi glabri, appendicibus tenuibus sublaevibus; achaenia prismatica

5-costata glandulifera superne vix constricta; carpopodia distincta magna, cellulis subquadratis inflatis; pappi setiformes, uniseriati, setis 25-30 gracilibus scabris persistentibus, cellulis apicalibus acutis vel subacutis.

Species typica: Eupatorium candolleanum Hook. & Arn.

Our studies indicate that the genus contains the following six species.

Barrosoa betonicaeformis (A.P. Decandolle) R.M. King and H. Robinson, comb. nov. Conoclinium betonicaeforme A.P. Decandolle, Prodr. 5: 135. 1836. Argentina, Bolivia, Brazil, Uruguay.

Barrosoa cabreræ (B.L. Robinson) R.M. King & H. Robinson, comb. nov. Eupatorium cabreræ B.L. Robinson, Contr. Gray Herb. 90: 21. 1930. Argentina, Uruguay?

Barrosoa candolleana (Hook. & Arn.) R.M. King & H. Robinson, comb. nov. Eupatorium candolleanum Hook & Arn. in Hook., Comp. Bot. Mag. 1: 243. 1835. Argentina, Bolivia, Brazil, Paraguay, Uruguay.

Barrosoa morichalana (Aristeguieta) R.M. King & H. Robinson, comb. nov. Eupatorium morichalanum Aristeguieta, Mem. New York Bot. Gard. 9: 367. 1957. Colombia, Venezuela.

Barrosoa ramboi (Cabrera) R.M. King & H. Robinson, comb. nov. Eupatorium ramboi Cabrera, Sellowia 15: 207. 1963. Brazil.

Barrosoa viridiflora (Baker) R.M. King & H. Robinson, comb. nov. Conoclinium viridiflorum Baker, in Mart., Fl. Bras. 6(2): 309. 1876. Brazil.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB - 20502 to the senior author.

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXXV.

A NEW GENUS, LOURTEIGIA.

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Six species from the northern Andes are here recognized as a new genus related to Gyptis (King & Robinson, 1971a), Conoclinium (King & Robinson, 1970b), Barrosoa (King & Robinson, 1971b), and showing some microscopic resemblance to Fleischmannia (King & Robinson, 1970a). Some of the species have been referred to the section Conoclinium but they lack the conical receptacle of that group. The most distinctive features of the genus Lourteigia are the rather consistent presence of 20 flowers per head, the distinct carpopodium of small firm-walled cells and the extreme constriction of the achene under the pappus. In this latter feature, the achene is narrowed to a third or less of its normal width and the pappus which is easily broken off, has a flat or even concave undersurface.

Some resemblance has been noted between Lourteigia and Fleischmannia. Actual close relationship is doubted. The cells on the inner surface of the corolla lobes of Lourteigia do not have the projecting upper ends that are so distinctive in Fleischmannia. In fact, the corolla lobes can hardly be called papillose on the inside though they have recessed walls between the cells. The cells on the insides of the corolla lobes are not markedly distinct from those of the corolla tube as they are in the genus Barrosoa. The cells at the base of the anther collars in Lourteigia are obviously short and some have obliquely or vertically oriented thickenings. The anther collars of Fleischmannia have only transverse thickenings and any short cells are not obvious.

Lourteigia R.M.King & H.Robinson, genus novum Compositarum (Eupatorieae). Plantae perennes herbaceae repentes vel frutescentes paucè vel dense ramosae. Paginae caulium et paginae abaxiales foliorum saepe mollissime albo-tomentosae. Folia opposita ovata vel anguste elliptica crenulata vel serrata, petiolo brevi. Inflorescentiae dense corymbosae. Involucris squamae ca. 20-25 inaequilongae 3-4-seriatae lanceolatae; receptacula plana glabra vel minute pubescentia. Flores 20 in capitulo; corollae infundibulares intus nonpapillosae glabrae, cellulis angustis, parietibus sinuosis, lobis extus dense setiferis et ad apicem valde papillosis; filamenta antherarum in parte superiore tenuia, cellulis plerumque breviter rectangularibus inferioribus brevioribus, parietibus dense tranverse vel oblique ornatis, cellulis exothecialibus plerumque subquadratis vel brevioribus, appendicibus antherarum late ovatis vel oblongis;

styli inferne non nodulosi glabri, appendicibus valde antrorse papillatis; achaenia prismatica 5-costata pauce setifera vel subglabra superne valde constricta; carpodia distincta plerumque asymmetrica obturaculiformia, cellulis quadratis paullo parvis, parietibus inter cellulas incrassatis dense moniliformibus; pappus saepe in monadis deciduus, setis ca. 30 gracilibus persistentibus, cellulis apicalibus acutis.

Species typica: Eupatorium stoechadifolium L. f.

Chromosome number determined as $n = 10$ (Powell & King, 1969).

It is with great pleasure that we name this new genus in honor of Dr. Alicia Lourteig of the Laboratoire de Phanérogamie, Muséum National d'Histoire Naturelle in Paris. Her work has contributed greatly to the taxonomy of South American plants.

Our studies indicate that the genus contains the following six species.

Lourteigia dichroa (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium dichroum B.L.Robinson, Contr. Gray Herb. 73: 10. 1924. Colombia.

Lourteigia humilis (Benth.) R.M.King & H.Robinson, comb. nov. Conoclinium humile Benth., Pl. Hartw. 199. 1845. Colombia.

Lourteigia lanulata (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium lanulatum B.L.Robinson, Proc. Am. Acad. 54: 249. 1918. Colombia.

Lourteigia microphylla (L.f.) R.M.King & H.Robinson, comb. nov. Eupatorium microphyllum L.f., Suppl. 355. 1781. Colombia.

Lourteigia ornatiloba (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium ornatilobum B.L.Robinson, Contr. Gray Herb. 80: 27. 1928. Colombia.

Lourteigia stoechadifolia (L.f.) R.M.King & H.Robinson, comb. nov. Eupatorium stoechadifolium L.f., Suppl. 355. 1781. Colombia, Venezuela.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB-20502 to the senior author.

Literature Cited

King, R. M. & H. Robinson. 1970a. Studies in the Eupatorieae (Compositae). XVIII. New combinations in Fleischmannia. Phytologia 19: 201-207.

——— & ———. 1970b. Studies in the Eupatorieae (Compositae). XIII. The genus Conoclinium. Phytologia 19: 299-300.

——— & ———. 1971a. Studies in the Eupatorieae (Compositae). XXXIII. The genus Gyptis. Phytologia 21: 22-25.

——— & ———. 1971b. Studies in the Eupatorieae (Compositae). XXXIV. A new genus, Barrosoa. Phytologia 21: 26-27.

ADDITIONAL NOTES ON THE GENUS HIEROBOTANA. I

Harold N. Moldenke

HIEROBOTANA Briq.

Additional & emended bibliography: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 221, pl. 135 (1817), ed. quart., 2: pl. 135 (1817), and ed. quart., 273—274. 1818; Steud., Nom. Bot., ed. 1, 873. 1821; Spreng. in L., Syst. Veg., ed. 16, 2: 749. 1825; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 604. 1843; Narnhart, Bull. Torrey Bot. Club 29: 500. 1902; Hayek in Engl., Bot. Jahrb. 42: 164. 1908; M. Kunz, Anat. Anat. Untersuch. Verb. 33. 1911; Metcalfe & Chalk, Anat. Dicot. 1031, 1032, & 1040. 1950; Angely, Cat. Estat. Gen. Bot. Fam. 17: 4. 1956; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): [Fl. Peru] 610. 1960; Moldenke, Phytologia 7: 300—304. 1960; Moldenke, Biol. Abstr. 36: 719. 1961; Hocking, Excerpt. Bot. A.4: 224. 1962; Moldenke, Résumé Suppl. 7: 8. 1963; Moldenke, Phytologia 9: 31 (1963) and 9: 397. 1964; F. A. Barkley, List Ord. Fam. Anthoph. 75 & 173. 1965; Moldenke, Phytologia 12: 6. 1965; Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 545. 1966; Anon., Torrey Bot. Club Ind. Am. Bot. Lit. 3: 309. 1969.

HIEROBOTANA INFLATA (H.B.K.) Briq.

Additional & emended synonymy: Verbena inflata Humb. & Bonpl. ex Steud., Nom. Bot., ed. 1, 873. 1821. Verbena inflata Humb. ex Spreng. in L., Syst. Veg., ed. 16, 2: 749. 1825. Verbena inflata Humb. & Kunth ex Benth., Pl. Hartweg. 245. 1846. Hierobotana inflata (Kunth) Briq. ex Moldenke, Résumé Suppl. 2: 9, in syn. 1960. Hierobotana inflata (H.B.K.) Hieron. ex Moldenke, Résumé Suppl. 7: 8, in syn. 1963.

Emended illustrations: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: pl. 135 [in color] (1817) and ed. quart., 2: pl. 135. 1817.

Recent collectors describe this plant as a low woody herb, forming spreading mats, the roots large, and the calyx green, tipped purple. Barclay & Juaibioy 8216 is said to have had the corollas "lavender to almost white, deeper color in throat of tube, with hairs". The plant has been found growing in dry desery climates, in sandy soil, on rocky hillsides and dry slopes, in open deserts and open grassy paramos, along disturbed roadsides, and among sparse grasses and low plants in dry open flat areas with some sand dunes, at altitudes of 1200—3700 meters, flowering and fruiting in March, April, July, September, and November.

Material has been misidentified and distributed in herbaria as Verbena microphylla H.B.K.

Additional citations: ECUADOR: Chimborazo: Barclay & Juaibioy 8216 (N); Fagerlind & Wibom s.n. [Guamote, X.1952] (Mi); F. C. Lehmann 174 (Bm); Rimbach 176 (W—1544716); Rose & Rose 22400 (W—1022053), 23906 (W—1023216); Sparre 18533 (S). Cotopaxi: Barclay & Juaibioy 7985 (N); Sparre 15689 (S), 15845 (S).

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XII

Harold N. Moldenke

CALLICARPA CANDICANS (Burm. f.) Hochr.

Prain (1903) tells us that this species is "often cultivated; occasionally naturalised in C[entral] Bengal. A large shrub; native of the Malay peninsula", called "arusha" in Bengal. Uphof (1968) reports that in Hindu medicine a decoction is made of the roots, leaves, and bark and that this is used in the treatment of skin diseases, parts of the plant are employed as an arrow-poison, and in the Philippines a decoction of the leaves is used as a fish-poison.

Vidal y Soler (1885) cites Cuming 1283 from the Philippine Islands, while Chang (1951) cites C. I. Lei 731, as well as nos. 139, 315, 873, 1026, 3379, 4049, 4837, 5975, 26009, 27239, 33351, 61557, 61931, 64567, 65228, 66541, 71432, & 72432 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters. For some reason unknown to me, Chang includes C. americana Lour. in the synonymy of what is now known as C. kochiana Mak., but most authorities, including myself, regard it as conspecific with C. candicans (Burm. f.) Hochr.

The H. H. Bartlett 14711 and Kjellberg 96, distributed and in the case of the latter also cited by me as C. candicans, are actually C. bicolor A. L. Juss., H. H. Bartlett 14698a and Quezon 1 [Herb. Philip. Forest. Bur. 30258] are C. erioclona Schau., and B. C. Stone 3931 is C. erioclona var. paucinervia (Merr.) Moldenke.

CALLICARPA CANDICANS var. SUMATRANA (Miq.) Moldenke

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 308. 1951; Hocking, Excerpt. Bot. A. 12: 423 & 424. 1967; Moldenke, Phytologia 15: 20. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968.

CALLICARPA CATHAYANA Chang

Additional & emended bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 300, 305, & 312. 1951; Moldenke, Phytologia 14: 140. 1966.

Chang (1951) describes this species as follows: "Frutex circ. 1.5 m altus. Ramuli graciles teretes pallide cinerei, hornotini sparse stellato-lepidoti vel glabrescentes, annotini glabri sparse lenticellati. Folia membranacea ovato-lanceolata, 4--7 cm longa, 1.5--2.5 cm lata, basin versus abrupte longe attenuata, apice acuminata, in parte 3/4 superiore densissime serrulata, supra viridia sparsissime puberula et rubro-punctata, subtus paulo pallidiora glabra dense rubro-punctata; nervi utrinsecus 5--7 supra conspicui subtus elevati fere recti ascendentes prope marginem arcuato-anastomosantes; petioli 2--4 mm longi. Flores violaceo-purpurei in cymis gracilibus ter dichotomis paucifloris 1.5 cm

latis, stellato-lepidotis, pedunculis 5--7 mm longis, pedicellis 2 mm longis aggregati; calyx 0.8 mm longus, truncatus, ut corolla et antherae rubro-punctatus, lobis inconspicuis; corolla 2 mm longa, lobis 0.5 mm longis; stamina paulo exserta, filamentis tubum corollae subaequantibus, antheris circ. 1.5 mm longis poro apicali dehiscentibus; ovarium glabrum, stylo stamina superante. Fructus purpureus 1.5 mm diametro."

The species is based on S. H. Chun 2171 from Canton, Kwangtung, China, deposited in the herbarium of the Botanical Institute, Sunyatsen University, Canton. Chang (1951) cites also H.-T. Chang 3560, J. M. Gilchrist 76 & 205, H. Y. Liang 61398, W. T. Tsang 21346, T. M. Tsui 450 & 601, and C. Wang 30145 from Kwangtung, S. K. Lee 81099 from Kwangsi, S. K. Lau 4409 and H. M. Mo 20966 from Kiangsi, and W. C. Cheng 1027 and Y. C. Keng 2382 from Kiangsu. He states that the species is related to C. bodinieri var. giraldii (Hesse) Rehd., C. dichotoma (Lour.) K. Koch, and C. japonica var. angustata Rehd., with which taxa he compares it.

CALLICARPA CAUDATA Maxim.

Additional bibliography: Moldenke, Phytologia 16: 363. 1968.

Sayers describes this plant as an erect shrub, found in regrowth at the sites of old village gardens in New Guinea, producing deep-mauve fruit. The corollas are described as "lavender" on H. H. Bartlett 13211 and as "pale-mauve" on Sayers N.G.F.21499. The E. D. Merrill "7115", cited in Phytologia 15: 20 (1967), is an error in transcription for E. D. Merrill 8117. The Mearns & Hutchinson s.n. [May 1906], distributed as C. caudata, is actually C. merrillii Moldenke.

Callicarpa merrillii may be distinguished readily from C. caudata by the simple hairs on the lower leaf-surfaces, but the two taxa are obviously closely related.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Bohol: M. Ramos s.n. [Herb. Philip. Bur. Sci. 43310] (W--1292598). Luzon: H. H. Bartlett 13211 (Mi). MELANESIA: NEW GUINEA: Northeastern New Guinea: Sayers N.G.F.21499 (M1).

CALLICARPA COLLINA Diels

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 299, 301--303, & 312. 1951; Moldenke, Phytologia 14: 147--148 (1966) and 16: 453. 1968.

Chang (1951) cites only the type collection of this taxon, comparing it with C. rubella Lindl. and C. brevipes (Benth.) Hance. He maintains C. brevipes f. yingtakensis P'ei as a valid taxon, citing the type collection and also nos. 145 & 52981 of collectors and/or herbaria whose names he gives only in Chinese characters.

CALLICARPA DENTICULATA Merr.

Additional bibliography: Quisumbing, Sympos. Ecol. Res. Humid Trop. Veg. 35. 1965; Moldenke, Phytologia 16: 363 & 373. 1968.

CALLICARPA DICHOTOMA (Lour.) K. Koch

Emended synonymy: Callicarpa dichotoma K. Koch ex H.-T. Chang, Act. Phytotax. Sin. 1: 271, 288, & 307. 1951.

Additional & emended bibliography: Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2 [Jap. Laubh. Winterzust.] 269, pl. 10, fig. 9. 1895; Lévl. in Fedde, Repert. Spec. Nov. 12: 182. 1913; Kanehira, Formos. Trees, ed. 2, 642—643 & 716. 1936; T. H. Everett, Cat. Hardy Trees & Shrubs 16. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 83. 1948; Hottes, Book of Shrubs, ed. 5, 167. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 271, 280, 288, 294—295, 305, 307, 310, & 311. 1951; Hottes, Book of Shrubs, [ed. 6, pr. 1], 167. 1952; Core, Pl. Tax. 402. 1955; Hottes, Book of Shrubs, [ed. 6, pr. 2], 167 (1958) and [pr. 3], 167. 1959; E. L. D. Seymour, Wise Gard. Encycl., ed. 6, 211. 1963; J. Bush-Brown, Shrubs & Trees Home Landsc. 72 & [205]. 1963; Radford, Ahles, & Bell, Guide Vasc. Pl. Carol. 282 & 283. 1964; Ohwi, Fl. Jap. 763—764. 1965; Thornberry, U. S. Dept. Agr. Agric. Handb. 165: 478. 1966; Tingle, Check List Hong Kong Pl. 37. 1967; Ornduff, Reg. Veg. 50: 86 & 124. 1967; Glasau, Sommergr. Ziergeh. 64. 1967; E. Lawrence, South. Gard., ed. 2, 186. 1967; Hocking, Excerpt. Bot. A. 11: 205. 1967; Moldenke, Phytologia 16: 363—364, 377, 378, & 451. 1968; Moldenke, Résumé Suppl. 16: 17 & 19 (1968) and 17: 7. 1968.

Additional & emended illustrations: Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 10, fig. 9. 1895; Hottes, Book of Shrubs, ed. 5, 167 (1950), [ed. 6, pr. 1], 167 (1952), [ed. 6, pr. 2], 167 (1958), and [ed. 6, pr. 3], 167. 1959.

Chang (1951) cites the K. Koch reference in the literature of this species as "2: 336" and he regards C. taquetii Lévl. as a synonym of C. dichotoma, whereas I classify it as C. japonica var. taquetii (Léveillé) Nakai.

Sykes describes the corollas of C. dichotoma as "mauve" and the fruit as "purple, globose, shining", questioning whether his no. 202/66 is the "same plant as no. 156063". Santamour (1967) gives its chromosome number as $n = 18$.

Tatnall (1947) notes that the species was "escaped and well established in a swampy thicket along Lee's River, Wilmington. Locality long since destroyed". Radford, Ahles, & Bell (1964) aver that it is "rare in bogs" in Henderson County, North Carolina, flowering there from July to frost and fruiting from September to frost. Additional vernacular names for the plant are "ko-shikibu" and "purple pearl", the former recorded from Japan, the latter from Hongkong. Ohwi (1965) gives its distribution as "Honshiu, Shikoku, Hyushu, Korea, Ryukyus, Formosa".

Thornberry (1966) implies that the following fungi are known to (or may) attack this species: Atractilina callicarpae Dearn. & Barth., Botryosphaeria callicarpae Cke., Cercospora callicarpae Cke., Coniothyrium callicarpae Cke., Meliola cookeana Soeg., Nectria cinnabarina Tode, and Physalospora obtusa (Schw.) Cke., although it seems most probable to me that most, if not all, of

these records apply to the native C. americana L.

Ohwi (1965) records the name "murasaki-shikibu zoku" for the genus Callicarpa as a whole and keys out the Japanese species known to him as follows: [nomenclature brought up to date]

1. Plants glabrous or thinly pubescent; calyx glabrous, with very short teeth.
2. Leaf-blades caudate, glandular-dotted on both surfaces.....
C. japonica var. luxurians
- 2a. Leaf-blades acuminate to acute at the apex, glandular-dotted on the underside only.
3. Cymes supra-axillary; anthers broadly ellipsoidal.....
C. dichotoma
- 3a. Cymes axillary.
4. Corolla 1 mm. long, not glandular-dotted; branches slightly 4-angled; leaf-blades with 12--14 pairs of secondaries.....C. takakumensis
- 4a. Corolla 3--5 mm. long, glandular-dotted; branches terete; leaf-blades with only 5--9 pairs of secondaries..
C. japonica
- 1a. Plants densely soft-pubescent to villous; calyx pubescent, 4-fid.
5. Leaves 5--10 cm. long, rounded to obtuse at the base; branches and leaves with whitish stellate hairs less than 1 mm. long; calyx-lobes lanceolate; flowers 4--5 mm. long, about 10 in a cyme; anthers 1.5--2 mm. long.....C. mollis
- 5a. Leaves 15--30 cm. long, gradually narrowed at the base; branches and petioles with pinnately branched hairs 1.5--3 mm. long; calyx-lobes linear; flowers about 1.5 mm. long, very many in a cyme; anthers about 0.7 mm. long.....
C. kochiana

Chang (1951) cites Courtois 5693, J. M. Gilchrist 107, T. Hai 281, Matthew 4854, McClure 20556, and T. M. Tsui 395 & 666, as well as nos. 112, 251, 589, 682, 815, 1197, 1243, 1791, 2491, 2498, 2749, 2766, 4012, 4521, 4541, 4546, 5127, 5201, 6394, 7217, 7260, 7778, 8269, 9709, 9882, 10653, 13532, 20407, 20751, 21075, 21911, 22939, 23862, 24679, 29682, 30621, 31464, 32487, 42071, 44032, 52729, 53808, 67086, 67139, 67155, 74855, 83642, 84702, 96330, 105193, & 130045 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters.

The E. D. Merrill 11112, Onashi & Sohma 10018 [Herb. Univ. Tokyo 11023], and Tsang 21346, distributed as C. dichotoma, are all actually C. japonica var. angustata Rehd., while Chiao 2617 is C. japonica var. rhombifolia H. J. Lam and C. Ford s.n. is C. nudiflora Hook. & Arn. Tsui 601 appears to be a mixture of C. dichotoma and C. japonica var. angustata.

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Okamoto s.n. [Sept. 9, 1941] (Ws); S. Suzuki s.n. [Oct. 2, 1951] (Se--141360); Togasi 380 (Se--147224). CULTIVATED: Japan: Togasi

1667 (Se--202650). Maryland: Cowgill 960 [F. H. B. 76216] (Mi). New Jersey: A. L. Moldenke s.n. [August 14, 1968] (Ps--167). New Zealand: W. R. Sykes 202/66 (Nz--171138, Rf).

CALLICARPA DOLICHOPHYLLA Merr.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 293. 1951; Moldenke, Phytologia 15: 21. 1967.

CALLICARPA ELEGANS Hayek

Additional bibliography: Moldenke, Phytologia 16: 364. 1968.

The Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46955], distributed as C. elegans, is actually C. formosana var. angustata Moldenke. On the other hand, material of C. elegans has been misidentified and distributed in herbaria as C. micrantha Vid.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45614] (B, Ca--309261, Z).

CALLICARPA ERIOCLONA Schau.

Additional bibliography: Vidal y Soler, Phan. Cuming. Philip. 134. 1885; Gibbs, Contrib. Phytogeog. & Fl. Arfak Mts. 218. 1917; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Phytologia 16: 364, 381, & 388. 1968.

Quezon describes this plant as attaining a height of 4 m., growing in open cultivated areas, and used as a fish-poison in Mindanao. Gibbs (1917) states that it is common at the edges of forests and in clearings, flowering and fruiting in January. He cites Gibbs 6205 and Lesson s.n. from New Guinea and Teijsmann s.n. from Mansinama Island. He says "This plant is distinguished from C. cana L. by the large, more lanceolate, irregularly serrate leaves, with very white pubescence underneath, and white flowers with longer exerted stamens. C. repanda K. Sch. & Warb. is possibly a synonym of this plant."

The Elmer 18086, distributed as C. erioclona, is actually C. bicolor A. L. Juss.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: H. H. Bartlett 14453 (Mi), 14629 (Mi), 14698a (Mi). Mindanao: Quezon 1 [Herb. Philip. Forest. Bur. 30258] (S).

CALLICARPA ERIOCLONA var. **PAUCINERVIA** (Merr.) Moldenke

Additional bibliography: Moldenke, Phytologia 16: 364. 1968.

Recent collectors describe this plant as shrubby or as a shrub 2 to 3 1/2 feet tall, with woody stems, growing on low limestone cliffs or at the edges of such cliffs, flowering in March and November, and fruiting in March. The corollas are described as "mauve" and the fruit as black on Henty & Frodin N.G.F. 27280 and the fruit as purplish on B. C. Stone 3931.

Additional citations: WESTERN PACIFIC ISLANDS: MARIANA ISLANDS: Guam: B. C. Stone 3931 (W--2410420). PALAU ISLANDS: Peleliu:

Hayne s.n. [1 Nov. 1945] (Mi). MELANESIA: BISMARCK ARCHIPELAGO: New Britain: Henty & Frodin N.G.F.27280 (N).

CALLICARPA ERYTHROSTICTA Merr. & Chun

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 280, 294, & 311. 1951; Moldenke, Phytologia 14: 184. 1966.

Chang (1951) cites the type collection of this species and a no. 71998, with the name of the collector or herbarium given only in Chinese characters, and gives its relationship as being with C. dichotoma (Lour.) K. Koch.

CALLICARPA FERRUGINEA Sw.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 246 (1789) and pr. 2, 2: 246. 1796; Moldenke, Phytologia 15: 24. 1967; Moldenke, Biol. Abstr. 49: 1325. 1968.

Recent collectors have found this plant growing in woods and in montane rainforests, at 5000 feet altitude, and describe it as a shrub, the corollas white, the filaments and anthers purple, flowering in June.

Additional citations: CUBA: Oriente: Alain & Clément 877 (W-2288006). JAMAICA: G. R. Proctor 6802 (W-2588117).

CALLICARPA FORMOSANA Rolfe

Additional & emended bibliography: Matsuda, Bot. Mag. Tokyo 27: 273--274. 1913; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; Kanehira, Formos. Trees, ed. 2, 643--644 & 716, fig. 599. 1936; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56--58, 62, 71, 86, & 87 (1942) and [ed. 2], 130, 131, 133--135, 140, 157, & 177. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 282, 283, 286, 287, & 310. 1951; Sonohara, Tawada, & Amano, ed. E. H. Walker, Fl. Okin. 131. 1952; Masam., Sci. Rep. Kanazawa Univ. 4: [Enum. Tracheophyt. Ryukyu Isls. 7:] 46. 1955; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Hocking, Excerpt. Bot. A.12: 424 & 425. 1967; Moldenke, Biol. Abstr. 49: 1325, 2290, & 4199. 1968; Moldenke, Phytologia 16: 364--366 & 447. 1968; Moldenke, Résumé Suppl. 16: 11. 1968.

Emended illustrations: Kanehira, Formos. Trees, ed. 2, 643, fig. 599. 1936.

Recent collectors have found this plant growing in open woods and report the vernacular variant "h8rai-murasaki".

Additional citations: WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: OKINAWAN ISLANDS: Okinawa: Amano 7803 (Ta); Kana-shiro 41 (Ta). FORMOSA: Degener & Degener 28978 (N). PHILIPPINE ISLANDS: Luzon: Kienholz s.n. [Los Baños, Nov. 1922] (Mi, Mi).

CALLICARPA FORMOSANA f. **ANGUSTATA** Moldenke

Additional bibliography: Moldenke, Phytologia 16: 365. 1968.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46955]

(Ca--309492).

CALLICARPA FORMOSANA var. CHINENSIS P'ei

Additional synonymy: Callicarpa peii Chang, Act. Phytotax. Sin. 1: 282--283. 1951. Callicarpa integerrima sensu P'ei apud Chang, Act. Phytotax. Sin. 1: 282, in syn. 1951 [not C. integerrima Champ., 1853, nor Lindl., 1936].

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 282--283. 1951; Moldenke, Phytologia 15: 26. 1967.

Chang (1951) elevates Pei's variety to specific rank, assigns to it a new epithet, C. peii, and designates a new type, L. Teng 118, from Canton, Kwangtung, China, deposited in the herbarium of the Botanical Institute, Sunyatsen University, Canton. However, it seems to me that under the present edition of the International Rules of Botanical Nomenclature, the type of the taxon remains the same as was originally designated by P'ei, viz., W. Y. Chun 5828. Chang (1951) gives the following emended and amplified description of the taxon: "Frutex erectus vel scandens. Ramuli teretes torti, hornotini pilis fulvo-stellato-farinosi obtekti, annotini punctati vel glabrescentes; internodia 5--8 cm longa. Folia subcoriacea elliptica vel late elliptica, 7--15 cm longa 4--8.5 cm lata, apice acuta, basi late acuta vel obtusa, integra, supra asprella nitida atro-viridia vel ad costam nervosque laterales utrinsecus 6--9 subtus elevatos brevissime stellato-puberula, subtus fulvo-stellato-pubescentia et minutissime aureo-glandulosa; petioli 1.5--2.5 cm longi, pilis fulvo-stellatis farinosi obtekti. Cymae supra-axillares sexies dichotomae 5--8 cm diametro; pedunculi 3--5 cm longi, indumento eo petiolorum similiter obtekti; pedicelli 1 mm longi glabri, sicut calyces minutissime aureo-glandulosi; bracteolae lineares 2 mm longae; calycis campanulatis 1 mm longis, tubus truncatus glaber, lobi inconspicui; corollae purpureo-rosae, tubus 2 mm longus, lobi 0.5 mm longi glabri; stamina longe exserta 5 mm longa, antheris ovatis 0.6 mm longis, longitudinaliter dehiscentibus; ovarium glabrum, stylis 7--8 mm longis. Fructus purpureo-roseus 2 mm diametro."

Chang cites R. C. Ching 6993, Z. S. Chung 84897, Kwangsi Museum 291, and W. T. Tsang 22814 from Kwangsi, S. K. Lau 4054 from Kiangsi, and W. Y. Chun 5828, S. K. Lau 25309 & 26152, and L. Teng 118 from Kwangtung. He compares the plant with C. integerrima Champ. and C. pedunculata R. Br. The C. chinensis Hort. which he mentions is actually a synonym of C. candicans var. sumatrana (Miq.) Moldenke.

CALLICARPA FORMOSANA var. LONGIFOLIA Suzuki

Additional synonymy: Callicarpa pedunculata var. longifolia (Suzuki) Chang, Act. Phytotax. Sin. 1: 287. 1951.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 279, 287, & 311. 1951; Moldenke, Phytologia 15: 26. 1967.

Chang (1951) cites the original publication of this variety as

page "131" in Suzuki's work (1933). He cites the type collection and also a no. 41133 of a collector or herbarium whose name he gives only in Chinese characters.

CALLICARPA FORMOSANA f. PARVIFOLIA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.12: 425. 1967; Moldenke, Phytologia 16: 365. 1968; Moldenke, Biol. Abstr. 49: 2290. 1968.

CALLICARPA FULVA A. Rich.

Additional bibliography: Moldenke, Phytologia 16: 365, 451, & 452. 1968.

CALLICARPA FULVOHIRSUTA Merr.

Additional bibliography: Moldenke, Phytologia 16: 365. 1968. Van Steenis (1967) states that this plant is related to C. barbata Ridl., C. havilandii (King & Gamble) H. J. Lam, C. involucrata Merr., C. saccata Steen., and C. superposita Merr.

CALLICARPA GLABRA Koidz.

Additional bibliography: Moldenke, Phytologia 16: 365 & 452. 1968; Moldenke, Résumé Suppl. 16: 12. 1968; Tuyama, Fl. Bonin Isls. 98. 1968.

A very interesting letter from my friend and colleague, Dr. E. H. Walker, dated July 26, 1968, contains a paragraph which is well worth quoting in full here: "In 1966 you verified Field & Lowe 6m as Callicarpa glabra Koidz. and in 1952 Walker & Tawada 6507 as the same. Both are cited in Phytol. 14: 236. 1967. In general they match your description. Field & Lowe 6m has flowers. You describe the corollas as 'resinous punctate on the outside' the anthers 'resinous punctate on both sides'. I do not find such glands on the corolla, only on the anthers. In this specimen the calyx has a single row of relatively large distinctive peltate scales just below the rim. The other specimen, 6507, is in fruit. The calyx lacks the distinctive scales, the fruits are glandular, the leaves distinctly narrower, and the branchlets gray, probably simply having matured beyond the early 'dark purplish or black' condition described. Perhaps these discrepancies are not significant. I have adjusted my description, based in part on yours (since you have seen more specimens than I have), to the variations in these two specimens, except for the peltate scales, which are ignored."

CALLICARPA GRACILIPES Rehd.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 279, 285—286, & 311. 1951; Moldenke, Phytologia 14: 237—238. 1967.

Chang (1951) cites only the type collection of this species.

CALLICARPA HAVILANDII (King & Gamble) H. J. Lam

Additional & emended bibliography: Van Steenis, Blumea 15:

147--149, fig. 2 k. 1967; Moldenke, *Phytologia* 16: 365--366. 1968; B. L. Burt, *Notes Roy. Bot. Gard. Edinb.* 29: 141--155. 1969; Brentzel, *Biol. Abstr.* 51: 1571. 1970.

Van Steenis (1967) says that this plant is related to C. barbata Ridl., C. fulvohirsuta Merr., C. involucrata Merr., C. saccata Steen., and C. superposita Merr.

CALLICARPA HITCHCOCKII Millsp.

Additional bibliography: Moldenke, *Phytologia* 15: 26. 1967.

Byrne calls this plant "boarhog bush" and describes it as 2 m. tall "not very common, only 2 individuals seen; upper surface of leaves dark-green when fresh; used in local medicine as a tonic". Popenoe found it in flower and fruit in October.

Additional citations: BAHAMA ISLANDS: Cat: Byrne 279 (Ws). Eleuthera: J. Popenoe s.n. [October 1966] (Ft--2357).

CALLICARPA HYPOLEUCOPHYLLA Lin & Wang, *Bull. Acad. Sin.* 8: 184--187 & 189, fig. 1, 2, & 5. 1967.

Bibliography: Lin & Wang, *Bull. Acad. Sin.* 8: 184--187 & 189, fig. 1, 2, & 5. 1967.

Illustrations: Lin & Wang, *Bull. Acad. Sin.* 8: 187 & 189, fig. 1, 2, & 5. 1967.

This species, of which the authors give a fine description and splendid illustrations, is based on J. L. Wang 5403, collected at Nanfengshan, at an altitude of 1000--1200 m., Formosa, in February, 1965, deposited in the herbarium of the National Taiwan University. The authors cite also two other (unnumbered) collections: Matsuda s.n. [Tashulin, Jan. 1937] and Simizu s.n. [Chin-suiyin, July 1937] in the same herbarium.

CALLICARPA INTEGERRIMA Champ.

Additional bibliography: H.-T. Chang, *Act. Phytotax. Sin.* 1: 270, 278, 281--282, & 311. 1951; Tingle, *Check List Hong Kong Pl.* 37. 1967; Moldenke, *Phytologia* 16: 364, 366, 381, & 388. 1968.

Chang (1951) cites nos. 310, 902, 2416, 5005, 8034, 21107, 21650, 21799, 25441, & 42751 of collectors and/or herbaria whose names he gives only in Chinese characters.

CALLICARPA INVOLUCRATA Merr.

Additional bibliography: Moldenke, *Phytologia* 16: 366. 1968.

Van Steenis (1967) states that this species is related to C. barbata Ridl., C. fulvohirsuta Merr., C. havilandii (King & Gamble) H. J. Lam, C. saccata Steen., and C. superposita Merr. The Clemenses describe it as a "recumbent shrub, 6 feet tall, fruits cauline, bright red", growing at the wet mouth of a rivulet, fruiting in November, and labeled their collection "Calli-carpa new?"

Additional citations: INDONESIA: GREATER SUNDA ISLANDS: Sabah: Clemens & Clemens 50237 (N).

CALLICARPA JAPONICA Thunb.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 246 (1789) and pr. 2, 2: 246. 1796; Maxim., Bull. Acad. Sci. St. Pétersb. 31: 77. 1886; Tasiro, Bot. Mag. Tokyo 8: 109. 1894; Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] 269, pl. 10, fig. 10. 1895; Kuroiwa, Bot. Mag. Tokyo 14: 126. 1900; Kawag., Bull. Kag. 1: 124 & 175. 1915; Simada, Trans. Nat. Hist. Soc. Formos. 31: 12. 1917; E. H. Wils., Journ. Arnold Arb. 1: 186. 1920; Sakaguchi, Gen. Ind. Fl. Okin. 18. 1924; Hottes, Book of Shrubs, ed. 1, 147 & 148. 1928; Sasaki, List Fl. Formos. 350. 1928; Mak. & Nemoto, Fl. Jap. Suppl. 622. 1936; T. H. Everett, Cat. Hardy Trees & Shrubs 16. 1942; Hatus., Journ. Jap. Bot. 24: 81. 1949; Hottes, Book of Shrubs, ed. 5, 168. 1950; Metcalfe & Chalk, Anat. Dicot. 1034, fig. 247 G. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: [269], 270, 272, 296, 299, 303--308, & 310--312. 1951; Hottes, Book of Shrubs, [ed. 6, pr. 1], 168. 1952; Masam., Sci. Rep. Kanazawa Univ. 4: 46. 1955; Hottes, Book of Shrubs, [ed. 6, pr. 2], 168 (1958) and [pr. 3], 168. 1959; Hocking, Excerpt. Bot. A.4: 332 (1962) and A.6: 92. 1963; E. L. D. Seymour, Wise Gard. Encycl., ed. 6, 211. 1963; Ohwi, Fl. Jap. 763--764. 1965; Santamour, Morris Arb. Bull. 16: 51--52. 1965; Hirata, Host Range & Geogr. Distrib. Powd. Mild. 276. 1966; Griffith & Hyland, U. S. Dept. Agr. Pl. Inventory 164: 197 & 229. 1966; Hyland, U. S. Dept. Agr. Pl. Inventory 168: 146 & 149. 1967; Glasau, Sommergr. Ziergeh. 64. 1967; E. Lawrence, South. Gard., ed. 2, 186. 1967; Ornduff, Reg. Veg. 50: 86 & 124. 1967; de Wit, Pl. World High. Pl. 2: 185. 1967; Hocking, Excerpt. Bot. A.11: 205 & 503 (1967), A.12: 424 (1967), and A.13: 569. 1968; Moldenke, Phytologia 16: 360, 366--378, 449, & 451. 1968; Moldenke, Biol. Abstr. 49: 1325 & 4199. 1968; Moldenke, Résumé Suppl. 16: 11, 12, 17, 18, & 25 (1968) and 17: 7 & 8. 1968; Kitagawa, Nat. Sci. & Mus. 36: 124. 1969; Saito & Tachibana, Ecolog. Rev. 17: 135. 1969; Hyland, U. S. Dept. Agr. Pl. Inventory 173: 60 (1969) and 174: 276. 1969; Anon., Biol. Abstr. 51: 11432. 1970; B.A.S.I.C. S.30. 1970; "L. R. F.", Biol. Abstr. 51: 11432. 1970; Inaizumi, Jap. Journ. Appl. Entomol. Zool. 14: 29--38. 1970.

Additional & emended illustrations: Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 10, fig. 10. 1895; Metcalfe & Chalk, Anat. Dicot. 1034, fig. 247 G. 1950.

It is worth mentioning here that Masamune (1955) regards the "C. japonica Thunb." of Maximowicz (1886), Matsumura (1899 & 1912, insofar as Ryukyu specimens are concerned), Kuroiwa [1900, "p.p. (sic mollis)"], Kawagoe (1915), Simada (1917), Wilson (1920), Sakaguchi (1924), and Makino & Nemoto (1936, insofar as Ryukyu specimens are concerned) as applying to C. japonica var. luxurians Rehd. That of Tasiro (1894) he thinks may actually refer to C. mollis Sieb. & Zucc. Sykes refers to his two collections cited below as having had "mauve" corollas, the fruit "becoming mauve", and fruiting in March. Recent collectors describe the plant as a deciduous shrub, to 1.5 m. tall. They have found it growing in

littoral scrub on Ishigaki Island, while on Miyako Island it is said to be "occasional in Pandanus scrub on limestone", forming a low bush 0.6 m. tall. The corollas on F. R. Fosberg 38312 are said to have been "lilac". Hyland (1969) describes the fruit as "purplish". Lawrence (1967) points out that the "deep purple" fruits, which he erroneously refers to as "berries", begin to color in August and drop off by October in the southern United States. Santamour records the chromosome count as $n = 18$. An additional vernacular variant recorded for the species is the Japanese "ohmurasaki-shikibu". Hirata (1966) records the powdery mildew fungus, Microsphaeraalni, as attacking this plant. Ohwi (1965) describes the plant as common and variable on the islands of Hokkaido, Honshu, Kyushu, and Shikoku. He includes C. japonica f. angustifolia Miq. in its synonymy, but I regard Miquel's name as a synonym of C. japonica var. angustata Rehd.

Ohwi (1965) keys out the Japanese forms of the genus as recognized by him as follows [with the nomenclature brought up to date]:

1. Plants glabrous or thinly pubescent; calyx glabrous, with very short teeth.
 2. Leaf-blades caudate, glandular-dotted on both surfaces.....
C. japonica var. luxurians
 - 2a. Leaf-blades acuminate to acute at the apex, glandular-dotted on the underside only.
 3. Cymes supra-axillary; anthers broadly ellipsoidal.....
C. dichotoma
 - 3a. Cymes axillary.
 4. Corolla 1 mm. long, not glandular-dotted; branches slightly 4-angled; leaves with 12--14 pairs of secondaries.....C. takakumensis
 - 4a. Corolla 3--5 mm. long, glandular-dotted; branches terete; leaf-blades with 5--9 pairs of secondaries.....
C. japonica
 - 1a. Plants densely soft-pubescent to villous; calyx pubescent, 4-fid.
 5. Leaves 5--10 cm. long, rounded to obtuse at the base; branches and leaves with whitish stellate hairs less than 1 mm. long; calyx-lobes lanceolate; flowers 4--5 mm. long, about 10 in a cyme; anthers 1.5--2 mm. long.....C. mollis
 - 5a. Leaves 15--30 cm. long, gradually narrowed at the base; branches and petioles with pinnately branched hairs 1.5--3 mm. long; calyx-lobes linear; flowers about 1.5 mm. long, very many in a cyme; anthers about 0.7 mm. long.C. kochiana
- Chang (1951) regards C. longifolia var. subglabrata Schau. as, in part, a synonym of C. japonica, but I feel that this trinomial belongs only in the synonymy of typical C. longifolia Lam. He cites A. N. Steward 57 and nos. 1631, 2617, 3303, & 10054 of collectors and/or herbaria whose names he gives only in Chinese characters.

Hyland (1967, 1969) cites U. S. Dept. Agr. 266234, 266329, &

304936 as cultivated in Maryland from seed obtained in Japan and K.495 from seed obtained in Korea. Inaizumi (1970) reports that C. japonica is attacked by an as yet unidentified species of the insect genus Aphis.

Material of C. japonica has been misidentified and distributed in herbaria as xC. shirasawana Mak. On the other hand, the Murata 27146 and Tsui 601, distributed as C. japonica, are actually C. japonica var. angustata Rehd., P. C. Hutchinson s.n. [Herb. Univ. Calif. Acc. 38.533-S1] is C. japonica var. luxurians Rehd., Chiao 2617 is C. japonica var. rhombifolia H. J. Lam, Oldham 621 is C. mollis Sieb. & Zucc., and Gressitt 532 & 563 are C. oshimensis var. iriomotensis (Masam.) Hatus.

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Murata 19185 (Au—274182, N, W—2499907); S. Suzuki s.n. [Jun. 5, 1951] (Se—180745). RYUKYU ISLAND ARCHIPELAGO: OKINAWAN ISLANDS: Kurema: Okuhara & Sunagawa 140 (Rf). Okinawa: Nakamine 275 (Ry, Ry). SAKISHIMA ISLANDS: Iriomote: Masamune & Nakamura 3280 (Tw). Ishigaki: Hatusima 24014 (Ar); Masamune & Suzuki s.n. [June 30, 1935] (Tw). Miyako: F. R. Fosberg 38312 (Rf). CULTIVATED: District of Columbia: T. R. Dudley s.n. [Herb. Nat. Arb. 15432; Pl. Introd. 266234] (Se—228379). New Zealand: W. R. Sykes 4/65 [Herb. Bot. Div. D.S.I.R. 156006] (Ac, Rf), 532/65 [Herb. Bot. Div. D.S.I.R. 156008] (Ac).

CALLICARPA JAPONICA f. ALBIBACCA Hara

Additional bibliography: Moldenke, Résumé Suppl. 16: 17. 1968; Moldenke, Phytologia 16: 368. 1968.

CALLICARPA JAPONICA f. ALBIFLORA Moldenke

Additional & emended bibliography: Hocking, Excerpt. Bot. A.11: 503. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968; Moldenke, Phytologia 16: 368. 1968.

CALLICARPA JAPONICA var. ANGUSTATA Rehd.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: [269], 299, 304--307, 310, & 312. 1951; Hocking, Excerpt. Bot. A.13: 569. 1968; Moldenke, Phytologia 16: 368, 371, & 449. 1968; Moldenke, Biol. Abstr. 49: 1325. 1968.

Recent collectors describe this plant as a woody climber, 3—5 feet tall, with a stem diameter of 1 inch, and black fruit, fruiting also in June [in addition to the months previously reported]. Tsang reports it as fairly common in dry sandy soil of roadside thickets. Chang (1951) cites a no. 51357 of a collector or herbarium whose name he gives only in Chinese characters. He compares it with typical C. japonica Thunb., C. bodinieri var. giraldii (Hesse) Rehd., and C. kwangtungensis Chun. Material has been misidentified and distributed in herbaria as C. bodinieri var. giraldii (Hesse) Rehd.

Additional citations: CHINA: Kwangtung: E. D. Merrill 11112

(Ca--301088); W. T. Tsang 21346 (Ca--1011274); Tsui 601 (Ca--612427, N). WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Murata 27146 (W--2409882). Tsushima: Ohashi & Sohma 10018 [Herb. Univ. Tokyo 11023] (W--2594171).

CALLICARPA JAPONICA var. *GLABRA* Nakai

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 270 & 310. 1951; Moldenke, Phytologia 16: 369. 1968.

CALLICARPA JAPONICA f. *KIIRUNINSULARIS* Masam.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 299, 304--305, & 312. 1951; Moldenke, Résumé Suppl. 16: 17. 1968; Moldenke, Phytologia 16: 370. 1968.

CALLICARPA JAPONICA var. *LUXURIANS* Rehd.

Additional synonymy: Callicarpa yakusimensis Koidz., Bot. Mag. Tokyo 28: 151. 1914. Callicarpa yakushimensis Koidz. ex Moldenke, Phytologia 5: 100, sphalm. 1954. Callicarpa japonica luxuri-ans Rehd. ex Moldenke, Résumé Suppl. 16: 17, in syn. 1968.

Additional & emended bibliography: Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 77 & 80. 1886; Maxim., Mém. Biol. 12: 513. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 257. 1890; Mak., Bot. Mag. Tokyo 6: 54. 1892; J. Matsum., Bot. Mag. Tokyo 13: 115. 1899; Kuroiwa, Bot. Mag. Tokyo 14: 126. 1900; Mak., Bot. Mag. Tokyo 18: 46. 1904; Koidz., Bot. Mag. Tokyo 28: 151. 1914; Kawag., Bull. Kag. 1: 124 & 175. 1915; Simada, Trans. Nat. Hist. Soc. Formos. 31: 12. 1917; E. H. Wils., Journ. Arnold Arb. 1: 186. 1920; Sakag., Gen. Ind. Fl. Okin. 18. 1924; Nakai, Trees & Shrubs, ed. 2, 463, fig. 220. 1927; J. Masam., Prel. Rep. Veg. Yak. 115. 1929; Mak. & Nemoto, Fl. Jap., ed. 2, 994 & 996. 1931; Mak. & Nemoto, Fl. Jap. Suppl. 622 & 623. 1936; Takenouchi, Journ. Nat. Hist. Fukuoka 2: 15. 1936; Kanehira, Formos. Trees, ed. 2, 644 & 716, fig. 600. 1936; Nakai in Shirasawa, Icon. Essenc. Forest. Jap. 2: [Terasaki, Zoku Nipp. Syokubutzuh] fig. 2481 & 2485. 1938; Hara, Enum. Sperm. Jap. 1: 184 & 186. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133, 134, 140, 157, 177, & 178. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 280, 295--296, 299, 304, & 310--312. 1951; Sonohara, Tawada, & Amano, ed. E. H. Walker, Fl. Okin. 131. 1952; Naito, Sci. Rep. Kag. 2: 60. 1953; Ohwi, Fl. Jap. 89. 1953; Masam., Sci. Rep. Kanazawa Univ. 4: 46--48. 1955; Oka, Hokuriku Journ. Bot. 4: 83. 1955; Griffith & Hyland, U. S. Dept. Agr. Pl. Inventory 164: 197 & 229. 1966; Moldenke, Phytologia 16: 360, 367, 370--375, & 377. 1968; Moldenke, Résumé Suppl. 16: 11, 12, 17, 18, & 25 (1968) and 17: 8. 1968.

In his 1949 work, Hatusima regards the name, C. japonica var. kotoensis (Hayata) Masam., as the correct designation for the taxon here being discussed, but Rehder's varietal epithet was validly published 24 years earlier!

Masamune (1955), Ohwi (1965), and Chang (1951) regard C. australis Koidz. as a synonym of C. japonica var. luxurians and in

this opinion they may well be correct. Masamune regards the "C. japonica Thunb." of Maximowicz (1886), Matsumura (1899 & 1912, insofar as Ryukyu specimens are concerned), Kuroiwa [1900 "p.p. (sic mollis)"], Kawagoe (1915), Simada (1917), Wilson (1920), Sakaguchi (1924), and Makino & Nemoto (1936, insofar as Ryukyu specimens are concerned) as actually referring to this same variety. Kanehira (1936) and Chang (1951) regard C. kotoensis Hayata as a valid species, with C. antaensis Hayata as a synonym. I regard C. antaensis as a synonym of C. longifolia Lam.

Matsumura (1955) cites the Maximowicz work (1886) as "1887" and Hara's 1948 work as "1949".

Recent collectors describe C. japonica var. luxurians as a shrub to 15 feet tall, growing among other shrubs on open slopes, in hedges along roadsides (on Okinawa), and common in secondary thickets (on Yonakuni Island), at 100--150 m. altitude, flowering in September, and fruiting in August (in addition to the months previously reported). The corollas on E. H. Walker 8452 are described as having been "pale lavender" and the anthers yellow. Additional vernacular names and variant orthographies recorded for the plant are "omurasakisikibu", "tosamurasaki", "tosamurasaki", "yakushima-ko-murasaki", "yakusima-komurasaki", and "yakusima-murasaki".

Ohwi (1965) says "July--Sept. Warmer districts; Shikoku, Kyushu" for what he regards as C. shikokiana Mak. and "July--Aug. Lowlands near the sea; Honshu, Shikoku, Kyushu; rather common" for what he regards as the true C. japonica var. luxurians. For the latter Masamune (1955) gives the overall distribution as "Yakusima, Shikoku, Kyushu, Itukusima, Syodosima", but other authors record it also from Tanegasima, Kutinoerabu, Takesima, Nakanosima, Suwanose, Takarazima, Amani-osima, Okati, Iheyazima, Okinawa, Minami-daitozima, Miyako, Isigaki, Iriomote, Sirahama, and Komi.

The P. C. Hutchinson s.n. [Herb. Univ. Calif. Acc. 38.533-Si], cited below, was cultivated in California from seeds collected in Poland, while the U. S. Dept. Pl. Invent. 235498 was cultivated in Maryland from the seeds of J. L. Creech 508 collected in Japan.

The Hatusima 24014 and Nakamine 275, distributed as C. japonica var. luxurians, are actually merely vigorous specimens of typical C. japonica Thunb.

Additional citations: WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: SATSUNAN ISLANDS: Yakushima: Tagawa & Konta 75 (N, W--2499881). OKINAWAN ISLANDS: Kunigami: Elliott & Nakamine 658 (W). Okinawa: Kimura & Hurusawa 61 (W--2126227); R. Moran 5076 (W--2186572); E. H. Walker 8452 (W). SAKISHIMA ISLANDS: Iriomote: Fukuyama s.n. [Herb. Univ. Imp. Taihok. 7326] (Tw); Yamazaki s.n. [Dec. 26, 1963] (Tk). Ishigaki: Masamune & Suzuki s.n. [Jul. 1, 1935] (Tw). Yonakuni: Hatusima 24532 (Ar). CULTIVATED: California: P. C. Hutchinson s.n. [Herb. Univ. Calif. Acc. 38.533-Si] (N).

CALLICARPA JAPONICA var. *RHOMBIFOLIA* H. J. Lam

Additional bibliography: Moldenke, *Résumé Suppl.* 16: 11. 1968; Moldenke, *Phytologia* 16: 368 & 376--378. 1968.

Recent collectors describe this plant as a shrub, 5--15 feet tall, growing in thickets and on rocky slopes along roadsides. The corollas are described as "white" on *Chiao* 2617 and the fruits as purple on *E. H. Wilson* 8109.

Material of this variety has been misidentified and distributed in herbaria as *C. oshimensis* Hayata. On the other hand, the *J. F. Rock* 2523, distributed as this variety, is actually *C. bodinieri* Léveillé.

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: *Okamoto* s.n. [July 17, 1924] (Ws). RYUKYU ISLAND ARCHIPELAGO: OKINAWAN ISLANDS: Okinawa: *E. H. Wilson* 8109 (W--1370942).

CALLICARPA JAPONICA var. *TAQUETII* (Léveillé) Nakai

Additional bibliography: Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 1], 57 & 87 (1942) and [ed. 2], 133 & 178. 1949; H.-T. Chang, *Act. Phytotax. Sin.* 1: 295. 1951; Moldenke, *Phytologia* 16: 378. 1968.

Chang (1951) regards *C. taquetii* Léveillé as a synonym of *C. dichotoma* (Lour.) K. Koch.

CALLICARPA KINABALUENSIS Bakh. & Heine

Additional bibliography: Moldenke, *Phytologia* 16: 378--381. 1968; Moldenke, *Résumé Suppl.* 16: 17. 1968.

Additional citations: INDONESIA: GREATER SUNDA ISLANDS: Sabah: *Clemens* & *Clemens* 31900 (N).

CALLICARPA KINABALUENSIS var. *ENDERTII* Moldenke

Additional bibliography: Moldenke, *Phytologia* 16: 380--381. 1968; Moldenke, *Résumé Suppl.* 16: 17. 1968.

CALLICARPA KINABALUENSIS var. *TONSA* Moldenke

Additional bibliography: Moldenke, *Phytologia* 16: 381. 1968; Moldenke, *Résumé Suppl.* 16: 17. 1968.

CALLICARPA KOCHIANA Mak.

Additional synonymy: *Callicarpa loureiri* var. *laxiflora* Chang, *Act. Phytotax. Sin.* 1: 276--277. 1951. *Callicarpa roxburghii* P'ei apud H. T. Chang, *Act. Phytotax. Sin.* 1: 276, in syn. 1951.

Additional & emended bibliography: Nakai in Nakai & Koidz., *Trees & Shrubs Indig. Jap.*, ed. 2, 1: 458--459, fig. 218. 1927; Kanehira, *Formos. Trees*, ed. 2, 645 & 716, fig. 601. 1936; Metcalfe & Chalk, *Anat. Dicot.* 1036, fig. 248 F. 1950; H.-T. Chang, *Act. Phytotax. Sin.* 1: 270, 271, 274, 276--277, 310, & 311. 1951; Tingle, *Check List Hong Kong Pl.* 37. 1967; Moldenke, *Résumé Suppl.* 16: 10--13, 17, & 18. 1968; Moldenke, *Biol. Abstr.* 49: 7688. 1968; Moldenke, *Phytologia* 16: 447--448 & 454. 1968.

Emended illustrations: Kanehira, *Formos. Trees*, ed. 2, 645, fig. 601. 1936.

Ohwi (1951) keys out the Japanese species of this genus known to him and his key (modified to bring the nomenclature up-to-date) is reproduced on page 42 of the present installment of notes.

Chang (1951), for some reason unknown to me, places C. americana Lour. in the synonymy of C. kochiana, but it seems to me that previous authors are correct in placing Loureiro's name in the synonymy of C. candicans (Burm. f.) Hochr. Chang cites T. M. Tsui 48 as well as nos. 146, 168, 262, 315, 317, 434, 609, 658, 815, 989, 1059, 1507, 1622, 1639, 2350, 2987, 3174, 4020, 4456, 4993, 5870, 9999, 10780, 11049, 16581, 20436, 21167, 21573, 21889, 25392, 25807, 31600, 32434, 40488, 41202, 50049, 60088, 60383, & 86212 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters. He describes his var. laxiflora as follows: "A typo recedit foliis angustioribus oblong-lanceolatis 11—15 cm longis, 3.5—4.5 cm latis, nervis paucioribus, utrinsecus 6—8, cymis laxis paulo diffusis, pedunculis brevioribus 5 mm longis, pedicellis longioribus 2 mm longis". The variety appears to be based on H. Fung 20404 from Hainan Island, collected in 1932, and deposited in the herbarium of the Botanical Institute of Sunyatsen University, Canton, China.

Additional citations: HONGKONG: Taam 1507 (N).

CALLICARPA KWANGTUNGENSIS Chun

Synonymy: Callicarpa brevipes sensu Hand.-Mazz. apud H.-T. Chang, Act. Phytotax. Sin. 1: 306, in syn. 1951 [not C. brevipes (Benth.) Hance, 1866, nor Hance, 1886].

Additional bibliography: Hand.-Mazz., Symb. Sin. 7: 901. 1936; Rehd. in Sarg., Pl. Wils. 3: 369. 1936; H.-T. Chang, Act. Phytotax. Sin. 1: 300, 306—307, & 312. 1951; Moldenke, Phytologia 16: 448—449. 1968.

Chang (1951) includes in the synonymy of this species a "Callicarpa japonica var. angustata Rehd. in Sarg., Pl. Wils. 3: 369. 1936, pro parte", but I see no justification for including this trinomial here since it applies to a perfectly valid and accepted variety of C. japonica, substantiated by the type collection. Chang cites the type collection of C. kwangtungensis as well as A. Henry 6679 and nos. 268, 1423, 2496, 2775, 4593, 4703, 4704, 10441, 20797, 22735, 30702, 30715, 52934, 54669, 54759, 83768, & 90519 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters.

CALLICARPA LINGII Merr.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 271, 299, 303, & 312. 1951; Moldenke, Phytologia 16: 452—453. 1968.

Chang (1951) cites only the original collection of this species.

CALLICARPA LOBO-APICULATA Metc.

Additional synonymy: Callicarpa loboapiculata Metc. ex H.-T.

Chang, Act. Phytotax. Sin. 1: [269]. 1951.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: [269], 274, 277, 278, 308, 309, & 311. 1951; Moldenke, Phytologia 16: 453-454. 1968; Moldenke, Résumé Suppl. 16: 10. 1968; Moldenke, Biol. Abstr. 49: 7688. 1968.

Chang (1951) cites Tse Hai 485 as well as nos. 728, 752, 2673, 2997, 5519, 5667, 6371, 10189, 21307, 22393, 22610, 22779, 40427, 73173, 75377, & 96334 of collectors and/or herbaria whose names he gives only in Chinese characters.

CALLICARPA LONGIBRACTEATA Chang, Act. Phytotax. Sin. 1: 277-278. 1951.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 271, 274, 277-278, & 311. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 16: 10. 1968.

Because of the extreme rarity of this journal in libraries, Chang's original (1951) description of this taxon is repeated herewith: "Frutex 3 m altus. Ramuli teretes hornotini dense fulvo-tomentosi; annotini glabrescentes cinereo-nigrescentes lenticellati. Folia oblonga vel elliptica 15-20 cm longa, 5.5-8 cm lata, apice acuminata, basi rotundata vel obtusa simul paulo obliqua, margine supra medium remorissime denticulata, supra costis nervisque exceptis glabra in sicco nigrescentia, subtus tomentosoincana; costa supra plana subtus elevata, nervis lateralibus utrinsecus 13-16 supra conspicuis subtus elevatis; petioli crassi 1.5-2.5 cm longi tomentosi. Cymae diffusae sexies dichotomae 6-9 cm latae tomentosae, pedunculis 3-5 cm longis; bractaeae foliaceae lanceolatae 3-4 cm longae, 8-12 mm latae, pilis atque iis foliorum similiter obiectae, nervis utrinsecus 8-10, stipitibus 8-10 mm longis suffultae; bracteolae subulatae; calycis stellato-pubescentis vel puberulis, tubus 1.5 mm longus, lobi 4-dentati, dentibus subulatis 1 mm longis; corollae stellato-pubescentes, tubus 1.5 mm longus, lobi 0.5 mm longi; stamina exserta, filamentis 4-5 mm longis, antheris 0.5 mm longis longitudinaliter dehiscentibus; ovarium glabrum, stylo 6-7 mm longo, stigmatibus dilatatis. Fructus 1.5 mm diametro."

The type and apparently only known collection of this species is W. Y. Chun 5121, collected in Hongkong in 1926 and deposited in the herbarium of the Botanical Institute of Sunyatsen University, Canton, China. The author compares it (in Chinese) with C. kochiana Mak., C. lobo-apiculata Metc., and C. macrophylla Vahl.

CALLICARPA LONGIFOLIA Lam., Encycl. Méth. 1: 563. 1785 [not C. longifolia Auct., 1965, nor Benth., 1962, nor Diels, 1916, nor Hance, 1890, nor Hemsl., 1916, nor Hook., 1932, nor L., 1820, nor Roxb., 1827, nor "sensi Hemsl.", 1949, nor "sensu L.", 1966, nor "sensu Mori", 1962].

Synonymy: Mamanira alba Rumph., Herb. Amboin. 4: 124, pl. 49. 1750. Hedyotis arborescens Noronha, Verh. Batav. Genootsch. 5, ed. 1, art. 14: 17. 1790. Callicarpa foliis lato-lanceolatis utrinque glabris, superne serratis Vahl ex Willd., Sp. Pl., 1:

621, in syn. 1797. Callicarpa (longifolia) foliis longis lanceo-
latis subdentatis utrinque viridibus, corymbis parvis axillaribus
Lam. ex Willd., Sp. Pl. 1: 621, in syn. 1797. Callicarpa lanceo-
laria Hort. ex Link, Enum. Pl. Berol. Alt. 1: 124, hyponym. 1821
[not C. lanceolaria Roxb., 1814]. Amictonis japonica (Thunb.
auct.) Raf., Sylv. Tellur. 161. 1838. Callicarpa japonica
"Thunb. auct." ex Raf., Sylv. Tellur. 161, in syn. 1838 [not C.
japonica Hort. ex Pritzel, 1866, nor Hort. ex Moldenke, 1936, nor
L. f., 1966, nor Matsum., 1923, nor Miq., 1927, nor Thunb., 1784].
Callicarpus longifolia Vahl apud Hassk., Cat. Pl. Hort. Bogor.
Cult. Alt. 136. 1844. Callicarpus longifolia Blume apud Hassk.,
Cat. Pl. Hort. Bogor. Cult. Alt. 136, in syn. 1844. Callicarpa
blumei Zoll. & Moritz, Syst. Verz. Zoll. 53. 1845-1846. Calli-
carpa longifolia α subglabrata Schau. in A. DC., Prodr. 11: 645.
1847. Callicarpa lanata β uberior Miq., Fl. Ned. Ind. 2: 887.
1856. Callicarpa purpurea Hort. ex Lem., Ill. Hort. 6: pl. 202,
in part. 1859 [not C. purpurea Hort. ex Moldenke, 1941, nor A. L.
Juss., 1806, nor Nakai, 1923, nor Van Houtte, 1932]. Callicarpa
cana Wall. (in part) apud Bocq., Adansonia 3: 192. 1863 [not C.
cana Dals. & Gibs., 1919, nor Gamble, 1881, nor L., 1771, nor
Spreng., 1966, nor Vahl, 1866]. Callicarpa longifolia var. sub-
glabrata Schau. apud Vidal y Soler, Phan. Cuming. Philip. 134.
1885. Callicarpa longifolia var. pubinervis Kuntze, Rev. Gen.
Pl. 2: 503. 1891. Amictonis japonica Raf. apud Jacks. in Hook.
f. & Jacks., Ind. Kew., pr. 1, 1: 106, in syn. 1893. Callicarpa
dentata Wall. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1,
1: 386, in syn. 1893 [not C. dentata Pav., 1936, nor Roth, 1818,
nor Roxb., 1831, nor Sessé & Moc., 1940]. Callicarpa longifolia
subglabrata Schau. ex Beissner, Schelle, & Zabel, Handb. Laubh.
425, in syn. 1903. Callicarpa longifolia var. subglabra Schau. ex
E. D. Merr., Philip. Journ. Sci. Bot. 7: 340. 1912. Callicarpa
attenuifolia Elm., Leaf. Philip. Bot. 8: 2870. 1915. Callicarpa
antaoënsis Hayata, Ic. Pl. Formos. 6: 35. 1916. Callicarpa javan-
ica Zipp. ex H. J. Lam, Verbenac. Malay. Arch. 87 & 88, in syn.
1919. Callicarpa longifolia var. uberior Miq. ex H. J. Lam, Ver-
benac. Malay. Arch. 87, in syn. 1919. Callicarpa virens Reimw.
ex H. J. Lam, Verbenac. Malay. Arch. 88, in syn. 1919. Callicarpa
longifolia var. areolata H. J. Lam, Verbenac. Malay. Arch. 90.
1919. Callicarpa cuspidata Hassk. apud Bakh. in Lam & Bakh., Bull.
Jard. Bot. Buitenz., sér. 3, 3: 26. 1921 [not C. cuspidata Bakh.,
1932, nor Roxb., 1814]. Callicarpa longifolia f. subglabrata
Schau. ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3,
3: 26. 1921. Callicarpa longifolia Blume apud Moldenke in Fedde,
Repert. Spec. Nov. 40: 96, in syn. 1936. Callicarpa americana
Hort. ex Moldenke in Fedde, Repert. Spec. Nov. 40, 96, in syn.
1936 [not C. americana Blanco, 1884, nor L., 1753, nor Lam., 1966,

nor Lour., 1794, nor Roxb., 1945, nor Sessé & Moc., 1893, nor Thunb., 1926, nor Willd., 1820]. Callicarpa longifolia Vahl ex Moldenke, Prelim. Alph. List Invalid Names 11, in syn. 1940. Callicarpus longifolia Lam. ex Moldenke, Prelim. Alph. List Invalid Names 13, in syn. 1940. Callicarpa longifolia var. subglobrata Schau. ex Kanehira & Hatus., Bot. Mag. Tokyo 56: 113, sphalm. 1942. Callicarpa logifolia Lam. ex P'ei, Bot. Bull. Acad. Sin. 1: 3, sphalm. 1947. Amictonis japonica (Thunb.) Raf. ex Moldenke, Résumé 234, in syn. 1959. Callicarpa tomentosa Thunb. ex Moldenke, Résumé 247, in syn. 1959 [not C. tomentosa Bakh., 1932, nor Hook. & Arn., 1918, nor König, 1893, nor L., 1959, nor L. ex Spreng., 1825, nor L. ex Willd., 1966, nor (L.) Murr., 1774, nor (L.) Santapau, 1965, nor Lam., 1783, nor Murr., 1774, nor Vahl, 1794, nor Willd., 1808, nor "sensu Matsum.", 1964]. Callicarpa lanata var. uberior Miq. ex Moldenke, Résumé 244, in syn. 1959. Callicarpa antaoensis Hayata apud Li, Woody Pl. Taiwan 821--822, in syn. 1963. Callicarpa blumei Zoll. ex Moldenke, Résumé Suppl. 14: 6, in syn. 1966. Callicarpa attenuatifolia Elm. ex Moldenke, Résumé Suppl. 15: 16, in syn. 1967. Callicarpa longifolia var. acuminatissima Ploem ex Moldenke, Résumé Suppl. 16: 17, in syn. 1968. Callicarpa longifolia var. glabrata Schau. ex Moldenke, Résumé Suppl. 16: 17, in syn. 1968.

Bibliography: Rumph., Herb. Amboin. 4: 124, pl. 49. 1750; Lam., Encycl. Méth. 1: 563. 1785; Noronha, Verh. Batav. Genootsch. 5, ed. 1, art. 14: 17. 1790; Lam., Tabl. Encycl. Méth. [Illustr. Gen.] 1: 293, pl. 69, fig. 2. 1791; Vahl, Symb. Bot. 3: 13--14. 1794; Raeusch., Nom. Bot. 37. 1797; Willd., Sp. Pl. 1: 621. 1797; Pers., Syn. Pl. 1: 133. 1805; Roxb., Hort. Beng. [10] & [83]. 1814; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 96. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409. 1820; Steud., Nom. Bot., ed. 1, 137. 1821; Link, Enum. Pl. Berol. Alt. 1: 124. 1821; Lindl., Bot. Reg. 10: pl. 864. 1825; W. J. Hook., Exot. Fl. 2: pl. 133. 1825; Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825; Blume, Bijdr. Fl. Nederl. Ind. 14: 817--818. 1826; J. A. & J. H. Schult., Mant. 3: 53 & 54. 1827; Spreng. in L., Syst. Veg., ed. 16, 4 (2): 41 (1827) and 5: 126. 1828; Wall., Numer. List 50. 1829; Roxb., Fl. Ind., ed. 2 [Carey], 1: 395. 1832; Raf., Sylv. Tellur. 161. 1838; D. Dietr., Syn. Pl. 1: 429. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Pers., Sp. Pl. 1: 343. 1842; Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844; Walp., Repert. Bot. Syst. 4: 129. 1845; Zoll. & Moritz, Syst. Verz. Zoll. 53. 1845--1846; Jacques & Hérincq, Fl. Jard. Eur. Man. Gén. Pl. Arb. 3: 503. 1845--1862; Lindl., Veg. Kingd. 663. 1846; Schau. in A. DC., Prodr. 11: 645. 1847; Champ. & Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 136. 1853; Lindl. & Paxt. in Paxt., Flow. Gard. 2: 165--166. 1853; Miq., Fl. Ned. Ind. 2: 887--888. 1856; Lem., Ill. Hort. 6: pl. 202. 1859; Mason, Burmah, ed. 2, 792. 1860; Bocq., Adansonia 3: 192. 1863; Pritzel, Icon. Bot. Ind. 1: 188. 1866; Hance, Ann. Soc. Nat., ser. 5, 5: 233. 1866;

Benth. & F. Muell., Fl. Austral. 5: 56--58. 1870; Roxb., Fl. Ind., ed. 3 [C. B. Clarke], 132. 1874; Brandis, For. Fl. NW. & Cent. India 3: 369. 1874; S. Kurz, Journ. Asiat. Soc. Beng. 45: 105--164. 1876; S. Kurz, Forest Fl. Brit. Burma 2: 275 & 589. 1877; Gamble, Man. Ind. Timb., ed. 1, 282. 1881; F. Muell., First Census 103. 1882; F. M. Bailey, Syn. Queensl. Fl. 377. 1883; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 570. 1885; Maxim., Mém. Biol. 12: 507--508. 1886; Vidal y Soler, Phan. Cuming. Philip. 134. 1885; Vidal y Soler, Rev. Pl. Vasc. Filip. 208. 1886; F. Muell., Second Census 173. 1889; F. M. Bailey, Rep. Gov. Sci. Exp. Bell.-Ker. 52. 1889; Watt, Dict. Econom. Prod. India 2: 27. 1889; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 253--254. 1890; N. E. Br. in Johnson, Gard. Dict. Suppl. 157. 1890; F. M. Bailey, Cat. Pl. Queensl. 35. 1890; Kuntze, Rev. Gen. Pl. 2: 503. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 106, 386, & 1100. 1893; F. M. Bailey, Bot. Bull. 8: 81. 1893; Bois, Dict. Hort. 232. 1893--1899; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 166. 1895; Koord., Meded. Lands Plant-tuin. Buitenz. 19: 558. 1898; F. M. Bailey, Queensl. Woods 104. 1899; Koord. & Val-et., Bijdr. Booms. Java 7: 176--177. 1900; H. N. Ridl., Str. Br. Roy. Asiat. Soc. 33: 123. 1900; H. N. Ridl., Fl. Singapore 123. 1900; Diels in Engl., Bot. Jahrb. 29: 548. 1900; F. M. Bailey, Queensl. Fl. 4: 1174. 1901; Gamble, Man. Ind. Timb., ed. 2, 525. 1902; Beissner, Schelle, & Zabel, Handb. Laubh. 425. 1903; Prain, Beng. Pl., ed. 1, 827 & 828. 1903; C. B. Clarke in J. Schmidt, Bot. Tidsskr. 26: 171. 1904; Prain, Rec. Bot. Surv. India 3: 260. 1905; F. N. Will., Bull. Herb. Boiss., sér. 2, 5: 430. 1905; Val-et., Bull. Dept. Agric. Ind. Néerl. 10: 51. 1907; King & Gamble, Journ. Roy. Asiat. Soc. Beng. 74 (2), extra no., 807--808, 1013, & 1017--1018. 1908; D. H. Scott in Solereder, Syst. Anat. Dicot., transl. Boodle & Fritsch, 1: 633. 1908; King & Gamble, Mat. Fl. Malay Penins. 803, 807--808, & 1017--1018. 1909; H. N. Ridl., Journ. Fed. Malay States Mus. 4: 56. 1909; C. K. Schneid., Ill. Handb. Laubholz. 594. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 529. 1912; Dunn & Tutchner, Kew Bull. Misc. Inf. Addit. Ser. 10: 202. 1912; Koord., Exkursionsfl. Java 3: 134. 1912; Elbert, Meded. Rijksherb. Leiden 12: 15. 1912; E. D. Merr., Philip. Journ. Sci. Bot. 7: 340. 1912; F. M. Bailey, Compreh. Cat. Queensl. Pl. 386. 1913; Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 629. 1914; H. J. Lam, Meded. Rijksherb. Leiden 37: 32--33. 1914; Koord. & Val-et., Atlas Baumart. Java 5: pl. 275. 1914; Elm., Leaf. Philip. Bot. 8: 2870. 1915; Hayata, Ic. Pl. Formos. 6: 35. 1916; E. D. Merr., Interpret. Rumph. Herb. Amboin. 559. 1917; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 4: 107. 1917; H. J. Lam, Verbenac. Malay. Arch. 51, 71, 86--90, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 11 & 25--27. 1921; H. N. Ridl., Journ. Malay Br. Roy. Asiat. Soc. 1: [Mal. For. Trees] 84. 1923; E. D. Merr., Enum. Philip. Pl. 3: 385. 1923; H. N. Ridl., Fl. Malay Penins. 2: 616--617. 1923; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 89--90. 1924; Bakh. in Bakh. & Lam, Nova Guinea 14, Bot. 1: 168. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 1311. 1927; Domin, Bibl.

Bot. 89 (6): 1109. 1928; S. Sasaki, List Pl. Formos. 349 & 350. 1928; Stapf, Ind. Lond. 1: 526. 1929; L. H. & E. Z. Bailey, Hortus 111. 1930; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 501, 503, & 508--512. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 30--31. 1932; Moldenke, Bull. Torrey Bot. Club 60: 55. 1932; Hochr., Candollea 5: 90. 1934; Junell, Symb. Bot. Upsal. 4: 81 & 83. 1934; Moldenke in Fedde, Repert. Spec. Nov. 39: 299 & 306 (1936) and 40: 56, 73--74, 88, 89, 91--93, 96--99, 102, 120, 122--125, 127, & 130. 1936; Beer & Lam, Blumea 2: 221--222. 1936; Kanehira, Formos. Trees, ed. 2, 644--645 & 715. 1936; Moldenke, Cult. Pl. 35. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 412 & 414--415. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 45 & 46. 1938; Moldenke, Alph. List Common Vern. Names 24, 28, & 30. 1939; Moldenke, Geogr. Distrib. Avicenn. 36. 1939; Moldenke, Annot. & Classif. List 108. 1939; Moldenke, Suppl. List Common Vern. Names 3, 5, 6, 8, 10, 11, 14, 15, & 20--24. 1940; Moldenke, Prelim. Alph. List Invalid Names 5, 9--13, 26, & 32. 1940; Moldenke, Suppl. List Invalid Names 2. 1941; Kanehira & Hatus., Bot. Mag. Tokyo 56: 113. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 54--71, 86, & 87. 1942; Moldenke, Alph. List Invalid Names 4, 8--11, 25, & 33. 1942; Moldenke, Phytologia 2: 94. 1945; Moldenke, Alph. List Cit. 1: 89, 100, 120, 160, 192, 220, & 284. 1946; P'ei, Bot. Bull. Acad. Sin. 1: 3. 1947; Moldenke, Phytologia 2: 343. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 50. 1948; Moldenke, Castanea 13: 121. 1948; Moldenke, Alph. List Cit. 2: 359, 392, 404, 409, 432, 433, 462, 470, 562, 565, 566, 580, 621, 634, & 643 (1948), 3: 659, 718, 728, 742, 813, 827, 840, 904, 936, & 971 (1949), and 4: 987, 1018, 1095, 1100, 1102, 1104, 1105, 1119, 1128, 1139, 1148, 1181, 1204, 1205, 1232, 1235, 1259, & 1260. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 124, 125, 128, 129, 131, 133, 135, 137--140, 143--148, 150, 152, 155, 157, 176, & 177. 1949; Rehd., Bibl. Cult. Trees 584. 1949; E. D. Merr., Ind. Raf. 204. 1949; Moldenke, Phytologia 3: 286, 294, & 380. 1950; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 359. 1951; H.-T. Chang, Act. Phytotax. Sin. 1: 271, 276, 280, 285, 290--293, 300, 303, 310, & 311. 1951; Anon., N. Y. Bot. Gard. Seed Exchange List 1952 p. 2. 1951; Moldenke, Phytologia 4: 83 & 121--124. 1952; Moldenke, Journ. Calif. Hort. Soc. 15: 85. 1954; Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke in Humbert, Fl. Madag. 174: 45, 46, & 48. 1956; Moldenke, Phytologia 6: 215 (1958) and 7: 77. 1959; Moldenke, Résumé 82, 155, 159, 160, 165, 166, 168, 172, 174, 175, 177, 179, 182, 186, 187, 189, 191--198, 200, 202, 203, 208, 211, 213, 234, 241--248, 298, 319, 443, & 444. 1959; Moldenke, Résumé Suppl. 1: 13, 16, & 24. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Puri, Indian Forest Ecol. 2: 516. 1960; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): 701. 1960; Moldenke, Biol. Abstr. 35: 1687. 1960; Rehman, Curr. Sci. 31: 302--303. 1962; Hocking, Excerpt. Bot. A.4: 592. 1962; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 14. 1962; Thothathri, Bull. Bot. Surv. India 4: 295. 1962; Moldenke, Résumé Suppl. 3: 20, 21, & 23 (1962) and 7: 6. 1963; Prain, Bengal Pl., ed. 2, 2: 617 & 618. 1963; Li,

Woody Pl. Taiwan 818, 821--822, & 944. 1963; Maheshwari, Fl. Delhi 281. 1963; Van Campo & Planchais, Pollen & Sp. 5: 471. 1963; Anon., Biol. Abstr. 43 (3): B.17. 1963; Santapau, Excerpt. Bot. A.7: 18. 1964; Moldenke, Résumé Suppl. 8: 3 (1964) and 12: 8. 1965; Chopra, Badhwar, & Ghosh, Poison. Pl. India 2: 695--696, fig. 175. 1965; Backer & Bakh., Fl. Java 2: 601. 1965; Neal, In Gard. Hawaii, new rev. ed., 726. 1965; Majeshwari & Singh, Dict. Econ. Pl. India 30. 1965; Moldenke, Résumé Suppl. 13: 6 (1966) and 14: 3, 6, & 7. 1966; Rao & Rabha, Bull. Bot. Surv. India 8: 301. 1966; Matthew, Bull. Bot. Surv. India 8: 164. 1966; Panigrahi & Joseph, Bull. Bot. Surv. India 8: 143 & 151. 1966; Moldenke, Phytologia 13: 427, 439, 475, 499, & 502 (1966), 14: 37, 38, 53--55, 58, 59, 62, 99, 101, 102, 107, 108, 111, 114, 118, 125--127, 143, 156, 167, 171, 172, & 191 (1966), 14: 220, 222, 223, 230, 237, 244, 245, 249, & 255 (1967), and 15: 15, 19, 27, 28, & 37--39. 1967; Tingle, Check List Hong Kong Pl. 37. 1967; Moldenke, Résumé Suppl. 15: 8--13, 16, & 17. 1967; Moldenke, Phytologia 16: 361, 364--366, 368, 371, 373, 377, 381, & 388. 1969; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 174 & 199. 1968; Uphof, Dict. Econ. Pl., ed. 2, 96. 1968; Moldenke, Résumé Suppl. 16: 8--13, 15, 17, & 18. 1968; M. A. Rau, Bot. Surv. India 10, Suppl. 2: 61. 1969.

Illustrations: Lam., Tabl. Encycl. Méth. [Illustr. Gen.] 1: pl. 69, fig. 2. 1791; Lindl., Veg. Kingd. 663. 1846; Koord. & Vallet., Atlas Baumart. Java 5: pl. 275. 1914.

Small slender bush or shrub, 0.6--5 m. tall, erect, woody, glabrate, sometimes rather straggling, rarely becoming a small slender tree to 10 m. tall or even a climber [e.g., K. Larsen 10267], the youngest parts sometimes slightly stellate-tomentose or glabrate throughout; stems to 6 inches in circumference and 1--10 cm. in diameter at breast height, smooth except for a few scattered pustules; branches comparatively slender, more or less tetragonal, mostly weak and spreading, usually glabrous; branchlets medium to slender, obtusely tetragonal, subglabrescent; each node of both the branches and branchlets usually marked by a circumferential ridge or scar resembling a stipule-scar, most conspicuous on glabrous branches; principal internodes 1.5--6 cm. long; leaves decussate-opposite; petioles rather slender, 4--21 mm. long, subglabrescent; leaf-blades very thin-chartaceous or membranous, varying from yellowish-green or light-green on both surfaces to rather dark-green on both surfaces or lighter beneath, lanceolate or broadly lanceolate to oblong-lanceolate or oblong, 6--18 cm. long, 2--6.5 cm. wide, long-acuminate and often somewhat caudate at the apex, more or less irregularly and very shortly dentate to serrulate or minutely denticulate-serrulate along the margins (except at the base), rarely subentire, attenuate into a more or less acuminate base, usually glabrate or obscurely strigillose above (glabrous or subglabrous when mature), glabrous or subglabrate beneath or thinly pubescent with simple or stellate hairs (the hairs usually simple on the lamina and stellate on the larger venation), marked with numerous, tiny, closely appressed, circular or elliptic, concave, golden-yellow scales; midrib slender, often

more or less furfuraceous beneath; secondaries slender, 7--10 per side, prominent beneath, arcuate-ascending, but often only very slightly arcuate, usually rather obscurely anastomosing at the margins; vein and veinlet reticulation delicate; inflorescence axillary or supra-axillary; cymes opposite, solitary, short- or rather long-pedunculate, 1.5--7 cm. long, 1--6.5 cm. wide, many-flowered, dense or slender and lax, several times dichotomous, often extremely loose-spreading with the angle of the primary furcations about 90°, bracteolate, very much shorter than the subtending leaves, subglabrescent; peduncles very slender, 6--17 mm. long; pedicels very slender, 0.5--2 mm. long; bractlets linear, 1--3 mm. long; prophylla minute, setaceous, pubescent or subglabrate; calyx campanulate, 1--1.3 mm. long, about 1.1 mm. wide, rather inconspicuously 4-costate, glabrous or subglabrate, its rim subtruncate, very shortly 4-toothed; corolla infundibular or hypocrateriform, purple, violet, rose-purple, or lavender to pink, pale-mauve, blue, whitish, or white, its tube broadly cylindric, about 1.3 mm. long, ampliate above, often somewhat granulose on the outer surface, scarcely pubescent, its limb 4-parted, the lobes erect or incurved, oblong-lingulate, rounded at the apex, usually somewhat granulose on the outer surface; stamens 4, inserted at the very base of the corolla-tube, exserted, pink or yellow; filaments filiform, about 3.1 mm. long, glabrous; anthers broadly oblong, about 0.5 mm. long and wide, the thecae light-yellow; pollen yellow; pistil long-exserted and surpassing the stamens (in ♀); style capillary, about 4.7 mm. long, pink, glabrous, ampliate above into the stigma; stigma depressed-capitate or peltate, white, about 0.5 mm. wide; ovary subglobose, about 0.5 mm. long and wide, densely granulose or glandular, not hairy, 4-celled; fruiting-calyx light, shallowly cupuliform or patelliform, about 2 mm. wide, mostly subglabrate, its rim subtruncate, frequently irregularly split; fruit globose or subglobose, small, mostly white when mature, rarely dark-pink, green when immature, 2.1--2.5 mm. long and wide, glabrous, 4-seeded.

This extremely variable and much misunderstood species occurs, in its typical form from eastern Pakistan and India through tropical southeast Asia, north to southern China and Hainan Island, and east to Indochina, Malaya, the Philippines, the Moluccas, New Guinea, New Ireland, and Queensland. It is widely cultivated and has been introduced in Peru and Madagascar. The type was collected by Pierre Sonnerat in the vicinity of Malacca before 1783 and is deposited in the Lamarck Herbarium at the Muséum National d'Histoire Naturelle at Paris. Because of the abundant confusion and misinterpretation of this taxon, Lamarck's original description is worth repeating here: "*Callicarpe à feuilles longues. Callicarpa longifolia. Callicarpa foliis longis lanceolatis subdentatis, utrinque viridibus, corymbis parvis axillaribus. N. C'est une espèce bien remarquable par la forme de ses feuilles, & qui est presque entièrement glabre dans toutes ses parties. Ses feuilles sont opposées, pétiolées, longues-lancéolées, pointues, à peine denticulées en leurs bords, minces, molles, vertes des deux côtes, & presque tout-à-fait glabres, excepté dans leur jein-*

esse. Elles ont sept à huit pouces de longueur, sue une largeur d'un pouce & demi. Les fleurs sont petites, disposées comme dans les précédentes; elles ont un calice court, presque tronqué ou à quatre dents peu sensibles; une corolle infundibuliforme & quadri-fide; quatre étamines une fois plus longues que le corolle; & un ovaire supérieur, dont le style aussi long que les étamines, est terminé par un stigmate en tête tronquée. Cette plante croît dans les environs de Malac, & nous a été communiquée par M. Sonnerat." In his 1791 work he says of it "*C. foliis longis lanceolatis subdentatis utrinque viridibus, cymis axillaribus laxiusculis. Circa urbem Malacam. 7 Fol. 8-pollicaria. Pl. distinctiss. à Callic. japonica Thunbergii.*"

The species has been found growing in forests, high forests, and rainforests, dense or evergreen forests, fairly wet open tall secondary or virgin forests, clearings, secondgrowth, rainforest regrowth, secondary scrub, small openings in rainforests, and open slightly shaded spots in primary forests, on level land or river gravel, hills and grassy hillsides, and slopes, along lanes and streams, and at abandoned campsites and scrub-edge, from sealevel to 2000 meters altitude, flowering and fruiting in every month of the year.

Lei describes it as "abundant scattered shrubs in sandy soil on dry level land along roadsides" on Hainan Island. Ridley (1909) avers that it is "Common in the low country" of Malaya. Hoogland reports it as "fairly common in low regrowth" in Papua, while Brass says that it is "plentiful in rainforest regrowths" and "common in rainforests" in the same land. Kanohira & Hatusima found it to be "fairly common at the edge of rainforests" in neighboring New Guinea and give its general distribution as "India through Malaya to New Guinea, northward to Formosa". In Thailand it is said by Smitinand to be "common along paths in evergreen jungle", Thaworn says "common in lowland evergreen forests", and Boonchuai, Bunnak, and Suvarnakoses all refer to it as "scattered in evergreen jungles". Lau tells us that on Hainan it is "fairly common in moist level land and clay soil of meadows". Panigrahi & Joseph (1966) says that the species is scarce in Nefa and cites his no. 14974. Matthew (1966) records it from West Bengal. Deb. Gupta, & Mallick (1968) tell us that in Bhutan it is found on the "outskirts of forests".

Watt (1889) says of it "A shrub of the Malaya Peninsula, Penang, and Nicobar Islands"; Ridley (1923) says "Tropical Asia", Bakhuizen van den Brink (1924) "southeast Asia and tropical Australia", and Domin "from Malacca through Malaya to northeast Queensland". Hooker & Mueller (1870) regarded it as native and "widely spread over the Indian Archipelago, extending into India to Khasia and East Bengal". P'ei (1947) records it from Szechuan, China, while Prain (1903) records it from "[Central] Bengal; Tippera; Chittagong". Several authors record it from "Prince of Wales Island", but it is not certain if they are referring to the island of this name in Penang or the one in Torres Strait near Australia.

Some Types and Range Extensions in Hybanthus (Violaceae)

C. V. Morton

In 1944, I published a paper "The Genus Hybanthus in Continental North America" (Contr. U. S. Nat. Herb. 29: 74-82. 1944). Since that time two significant papers have been published on Hybanthus, one by L. B. Smith and A. Fernandez-Perez, on the Colombian species (Caldasia 6: 124-136. 1954) and one, by Standley and Williams, on the Guatemalan species (Fieldiana, Bot. 24 (7, no. 1): 72-76. 1961). At the time of my publication I had not seen some of the essential types. Since then I have studied the specimens in various European herbaria, especially those in London and Paris. These studies did not reveal any misinterpretations in the paper, but two of the dubious species can now be placed, leaving only two still dubious--Ionidium lasiocarpum Presl and I. lobelioides Schlecht. My notes on types and some range extensions are here brought together, with comments also on three new species recently described from Central America by others.

HYBANTHUS ATTENUATUS (Humb. & Bonpl.) G. K. Schulze, Notizbl. Bot Gart. Berlin 12: 114. 1934.

Ionidium attenuatum Humb. & Bonpl. ex Roem. & Schult. in L. Syst. Veg. ed. nov. 5: 402. 1819. TYPE: Cited merely as "in America meridionali"; the subsequent publication of the nomenclaturally synonymous name Ionidium riparium H. B. K. gave the type locality as Angostura de Carare, on the banks of the Río Magdalena, Colombia, Humboldt and Bonpland. The holotype is presumably in the Willdenow Herbarium, Berlin.

Ionidium riparium H. B. K. Nov. Gen. & Sp. 5: 378. 1823. This is a superfluous change of name of I. attenuatum, which is cited as a synonym. The description is much amplified from the brief one given by Roemer and Schultes, and a definite locality is cited. The specimen that served for the description is in the Humboldt Herbarium, Paris (no. 1643, from Angostura, Río Magdalena, Colombia); there is a duplicate from the Bonpland Herbarium in the general herbarium in Paris. In my 1944 paper I did not cite any type from H. attenuatus. The Paris specimens show that the species was correctly interpreted.

Ionidium calceolarium Ging. in DC. Prodr. 1: 311. 1824. TYPE: Mexico, Sessé & Mociño. Gingins saw only a drawing. I have now seen a Sessé and Mociño specimen at Kew named Viola calceolaria which agrees with Gingins' description and with Sessé and Mociño's own later published description of their Viola calceolaria. This Kew specimen is here designated lectotype. It is a synonym of Hybanthus attenuatus, and has nothing at all to do with Viola calceolaria L.

Viola calceolaria Sessé & Mociño, Plant. Nov. Hisp. ed. 2, 141. 1893, non L., 1763. Described from a garden in Mazatlan, Mexico. To be lectotypified as above by a specimen so named at Kew. The name was presumably published in the first edition which I have not seen.

Ionidium botterii Turcz. Bull. Soc. Nat. Moscou 36(1): 556. 1863. TYPE: Orizaba, Veracruz, Mexico, Botteri s.n. This species has never been placed. I have not seen the type, but a collection of Botteri 319 in the British Museum is from Orizaba and agrees fairly well with the original description, except that the upper flowers are not subsessile. It is likely that this does represent I. botterii, which is then identical with H. attenuatus, which is well known from Orizaba and adjoining regions.

Calceolaria mocinoana Kuntze, Rev. Gen. Pl. 1: 41. 1891. A new name for Ionidium calceolarium Ging.

HYBANTHUS BREVIS (Dowell) Standl. in Standl. & Calderon, List. Prel. Pl. Salvador 152. 1925.

Calceolaria brevis Dowell, Bull. Torrey Bot. Club 33: 552. 1906.

TYPE: Volcán Jumaytepeque, Santa Rosa, Guatemala, Heyde & Lux 3943¹ (US).

This species, which I reduced to H. elatus in my revision, appears sufficiently distinct in foliage characters. The leaves are small, not more than 8 cm. long, and merely acute whereas those of H. elatus are generally 13--15 cm. long, and long-attenuate at tip; the midribs and veins beneath are minutely but obviously puberulous in H. brevis and glabrous in H. elatus. The range is Chiapas (Sumidero of Yochib, Koltol Te', Breedlove 6231; Moel Ch'en, above Tenejapa, Breedlove 10902) and Guatemala (Cobán, Alta Verapaz, Tuerckheim II 1354; Volcán Jumaytepeque, Santa Rosa, Heyde & Lux 4435; Río Frio, between Tactic and Santa Cruz, Alta Verapaz, Molina & Molina 12248; Cerro Pixpí, Huehuetenango, Steiermark 50590). As may be noted, the departments of Guatemala in which H. brevis occurs are all different from those where H. elatus has been found, which may indicate some ecological preferences.

HYBANTHUS CALCEOLARIA (L.) G. K. Schulze, Notizbl. Bot. Gart. Berlin 12: 114. 1934.

In 1944 I knew this distinctive species in North America from only a single collection from British Honduras, and suspected that it might be an introduction. This is evidently not true, for the species is now known from several collections from British Honduras and also from Veracruz and Oaxaca, Mexico, viz.: Mexico: East of Alvarado, Veracruz, Miranda 8513; northeast of Minatitlán, Veracruz, King 1051; northwest of Zanatepec, Oaxaca, King 483; east of

¹ By a typographical error cited as 2943 in my 1944 paper.

Niltepec, King 1809; British Honduras: Jenkins Creek, Stann Creek District, Hunt 363; San Luis Road, El Cayo District, Augustine, Hunt 225; Cow Pen, Toledo District, Gentle 4076.

HYBANTHUS CHIAPENSIS Lundell, *Wrightia* 4: 36. 1968.

TYPE: Carelas, Chiapas, Mexico, Matuda 5514.

I have seen no material. This is the fifth shrubby species known from Mexico. It can be distinguished from the others by its solitary flowers, small, congested leaves, and large capsules ca. 1 cm. long.

HYBANTHUS ELATUS (Turcz.) Morton, *Contr. U. S. Nat. Herb.* 29: 80. 1944.

In my revision I placed Hybanthus brevis (Dowell) Standl. as a synonym, but a reexamination of the type and other material indicates that it can stand as distinct. The true H. elatus is represented by specimens from Veracruz (Botteri 895, L. C. Smith 1840), Mexico (Tequezquahuac, Cerro de Azompan, Matuda 31181, US), Ghiesbreght 47 (perhaps from Chiapas?), and Guatemala (Finca Vergei, San Marcos, Standley 68921; Aldea Fraternidad, San Marcos, Williams et al. 26024; Volcán Fuego, Chimaltenango, Steyermark 52056; Volcán Santa Clara, Suchitepéquez, Steyermark 46627; between Finca Pirineos and Patzulín, Quezaltenango, Standley 87076; between Santa María de Jesus and Palín, Escuintla, Standley 61293. The specimen that I cited from Oaxaca (Conzatti & Cancino 2432) proves on further study to represent H. verbenaceus (H. B. K.) Loesen. I still have not seen the type of H. elatus, which is presumably in Leningrad, and so it is placed from the description only.

HYBANTHUS GALEOTTII (Turcz.) Morton ex Williams, *Fieldiana Bot.* 29: 358. 1961.

Ionidium galeottii Turcz. *Bull. Soc. Nat. Moscou* 27(2): 339.

1854. TYPE: Jalapa, Veracruz, Mexico, Galeotti 7085.

Hybanthus occultus (Polak.) Standl. *Field Mus. Publ. Bot.* 18: 714. 1937.

In 1944, I adopted the name H. occultus and regarded Ionidium galeottii as a dubious species. However, I have now seen a photograph (Field Museum no. 24006) of an isotype of I. galeottii from the herbarium in Geneva, and this shows that the species is identical with Purpus 13012, from Zacuapan, Veracruz, Mexico, the type of Hybanthus purpusii Standl., which I consider the same as the Costa Rican H. occultus (Polak.) Standl. Since Ionidium galeottii (1854) has priority over I. occultum Polak. (1877), the new combination H. galeottii was necessary.

Although I treated this plant among the herbaceous species of the genus, it is actually usually a shrub. According to the data on Skutch 2413, it is: "A shrub 2 m. high, with slender, wiry stems; flowers white, with a yellow spot at base of the large petal." According to Austin-Smith H796: "Open diffuse shrub with stems

over 1 m. long; bark pale brown; leaves thin, faintly scabrous; lower lip petal large, pure white." Steyermark 49639 says "Shrub 3 feet tall; petals lilac-white; leaves membranous, rich green above, pale green beneath." These quotations show that there may be some variability in the flower color.

HYBANTHUS MEXICANUS Ging. in DC. Prodr. 1: 312. 1824.

TYPE: Mexico, Sessé & Mocino (not seen; no exact locality cited)

Key to the Subspecies

Leaves obviously pilose on the surfaces of both sides. Yucatán.
subsp. pilosus

Leaves glabrous on the surfaces.

Leaf midrib above with rather few, largest spreading hairs. San Luis Potosí.... subsp. mexicanus

Leaf midrib above puberulous, the hairs minute, numerous, curved. Sonora, Sinaloa, Baja California...subsp. occidentalis

Subsp. MEXICANUS

Restricted to San Luis Potosí apparently (Pringle 3063, syntype of Alsodeia parvifolia S. Watson), 4019 (syntype of Alsodeia parvifolia S. Watson); Purpus 4897, 5455).

Subsp. OCCIDENTALIS Morton, subsp. nov.

Folia in superficiebus omnino glabra, marginibus vix ciliolatis, costa supra minute et subdense puberula.

Type in the U. S. National Herbarium, no. 1,686,634, collected at Arroyo de Mescales, Río Mayo, Sonora, July 21, 1936, by H. S. Gentry (no. 2291). Described on label as "a shrub two or three meters high, at the foot of a forested slope, tropical Sonoran zone."

PARATYPES (all from Mexico): Cerro Prieta, near Culiacan, Sinaloa, Nov. 30, 1944, alt. 150-500 feet, Gentry 7114 (US), "spreading under-shrub; flowers dull white"; Western slopes of Sierra de la Laguna, east of Todos Santos, Baja California, Dec. 28, 1947, Carter, Alexander, & Kellogg 2453, "straggly tree up to 6 m. tall; flowers creamy white; in tall, fine-leaved leguminous forest on lower slopes"; Cape Region, Baja California, Nov. 4, 1902, T. S. Brandegee (US) (distributed as Alsodeia parvifolia).

Subsp. PILOSUS Morton, subsp. nov.

Folia utrinque evidenter pilosa.

Type in the U. S. National Herbarium, no. 1,266,286, collected in Yucatan, Mexico, 1917--1921, by George F. Gaumer (no. 23,944) (Distributed as Hybanthus acalyphoides Standl., an unpublished name).

PARATYPES (all from Yucatán): Buena Vista Xbac, Gaumer 1044 (US); without specific locality, Gaumer 24, 168 (US).

HYBANTHUS OPPOSITIFOLIUS (L.) Taubert, in Engl. & Prantl, Nat. Pflanzenfam. 3(6): 333. 1895.

Ionidium longifolium Sessé & Mocino ex Ging. in DC. Prodr. 1: 311.

1824. TYPE: Mexico, Sessé & Mocino. Gingins saw no specimens. There is a Sessé and Mocino specimen in the British Museum determined as Viola longifolia from "N. E.," i.e. Nueva España (=Mexico). This agrees with Gingins' description

and is surely authentic. It is here designated lectotype. My 1944 disposition of the species as a synonym of H. oppositifolius was correct. Mounted on the same sheet is another Sessé and Mociño specimen from Mexico with the name "Viola linearifolia," unpublished name; this is also a poor specimen of H. oppositifolius.

Ionidium parietariifolium DC. Prodr. 1: 308. 1824.

Ionidium parietariifolium var. houstonii DC. Prodr. 1: 308. 1824.

Ionidium parietariifolium var. berterii DC. Prodr. 1: 308. 1824.

The species I. parietariifolium was originally divided into two varieties α houstonii and β berterii. It is evident that var. α is to be considered as the typical variety. It was based on a collection from Veracruz in the Banks Herbarium (British Museum) and on a specimen in the Lambert Herbarium from Peru collected by Ruiz and Pavon. I designate the specimen in the British Museum as lectotype; it bears the notation "Viola americana annua erecta parietariaefolio flore oblongo" and was evidently from the Miller Herbarium and collected by Houston. It represents typical Hybanthus attenuatus (Humb. & Bonpl.) G. K. Schulze. The var. berterii was described from "in Sanctae Marthae", evidently the Santa Marta Mountains, Colombia, collected by Bertero. I have seen an isotype in Paris labelled "Ins. S. Marthe, de M. Balbis cuilli par M. Bertero, no. 35." The "Ins.," i.e. "insula" is evidently an error for "in," since Santa Marta is not an island. This specimen probably represents H. attenuatus also, but it is dwarf and atypical.

Although a perennial, H. oppositifolius sometimes flowers the first year from seed and therefore appears annual. Annual plants can be distinguished from the strictly annual H. attenuatus by the essentially glabrous stems, those of H. attenuatus being strongly pilose in broad lines. This may now be reported also from British Honduras (Mountain Pine Ridge, El Cayo District, Lundell 6661; Augustine, El Cayo District, Hunt 117) and Honduras (El Zamorano, Morazán, Standley 19009).

HYBANTHUS PROCTORI Lundell, Wrightia 4: 37. 1968.

TYPE: Between Pulay and San Juan Cotzal, El Quiché, Guatemala, Proctor 25009.

I have not seen the type, but there is a paratype in the National Herbarium: Nebaj, El Quiché, Contreras 5032. This is an herbaceous species that will run to H. verbenaceus in my key, to which it is not perhaps closely allied. It has much larger, differently shaped leaves, and elongate pedicels.

HYBANTHUS PRUNIFOLIUS (Humb. & Bonpl.) G. K. Schulze, Notizbl. Bot. Gart. Berlin 12: 114. 1934.

Viola prunifolia Humb. & Bonpl. ex Roem. & Schult. in L. Syst.

Veg. ed. nov. 5: 391. 1819. TYPE: Presumably in the Willdenow Herbarium, Berlin, collected by Humboldt and Bonpland. No locality other than "America meridionalis" was cited, but

the specific locality was given by H. B. K. under nomenclaturally the synonymous Ionidium anomalum as "in sylvis (Bosque del Zapote) juxta Turbaco, 190 hex. Regno Novo-Granatensi," [i.e., near Turbaco, Department of Bolívar, Colombia].

Ionidium anomalum H. B. K. Nov. Gen. & Sp. 5: 381, t. 500. 1823.

A superfluous change of epithet for Viola prunifolia Humb. & Bonpl., cited as a synonym. The description is much amplified from that given by Roemer and Schultes. I have seen the isotype in the Humboldt Herbarium, Paris, and another in the general Herbarium, Paris, no. 1454 from the Bonpland Herbarium, noted as from Turbaco.

HYBANTHUS SERRULATUS Standl. Journ. Washington Acad. Sci. 17: 312. 1927.

In 1944 this species was known only from the type from Michoacán or Guerrero, Langlassé 558. Mr. George Hinton turned up three additional collections in his extensive explorations of western Mexico: Ocatitlán, State of Mexico, Hinton 8587; Puerto Zazamora, Michoacán, Hinton 12716, and Vallecitos, Guerrero, Hinton 11654.

HYBANTHUS SYLVICOLA Standl. & Steyerl. Field Mus. Publ. Bot. 23: 176. 1944.

TYPE: Finca Los Alpes, Pila-pec, Alta Verapaz, Guatemala, Wilson 329.

I have not seen the type. A specimen identified by Lundell as probably this is Seamay, Petén, Guatemala, Contreras 6656, and from the description it does appear to be the same. This is the sixth shrubby species known from Central America. It does not appear to be closely allied to the others, differing in its large, glabrous, lanceolate, entire leaves, and its small, fasciculate flowers on slender pedicels.

HYBANTHUS THIEMEI (Donn. Smith) Morton, Contr. U. S. Nat. Herb. 29: 81. 1944.

This species has been previously known in Mexico only from Campeche. It may now be reported also from Yucatan, Gaumer in 1895, no. 855 (BM), without specific locality (originally distributed as Ionidium brevicaulis Mart.). It may also be reported from Costa Rica for the first time: Vicinity of El General, Prov. San José, Skutch 3960, 3975 (both US).

HYBANTHUS VERBENACEUS (H. B. K.) Loesen. Bull. Herb. Boiss. II, 3: 215. 1903.

Ionidium verbenaceum H. B. K. Nov. Gen. & Sp. 5: 379, t. 497. 1823.

In my 1944 paper I did not cite a type for this species. It was described from "in Horto Mexicano," i.e. in a Mexican garden. Since this species is by no means ornamental and has no known uses, it may be assumed that the original plant was naturally occurring in the garden rather than cultivated. I have now seen the holotype in the

Humboldt Herbarium in Paris (no. 4024, marked "Hort. Mexican.") It shows that the species was correctly interpreted in my paper. The type is a small perennial, with the acute leaves cuneate at base, ca. 2 cm. long and 1.5 cm. broad, bluntly toothed, with about eight teeth on either side; the calyx lobes are slender and pubescent and the labellum not villous; there are no capsules present. It is similar to a specimen in Paris collected by Brother Nicolas (s.n.), at Guadelupe, Puebla, Mexico, June 15, 1910.

HYBANTHUS VERTICILLATUS (Ortega) Baill. Hist. Pl. 4: 345. 1873

Ionidium lineare Torr. Ann. Lyc. New York 2: 168. 1828. TYPE:
Red River, Ark., James.

Hybanthus linearis (Torr.) Shinnars, Field & Lab. 19: 126. 1951.

Shinnars has adopted the name H. linearis for the common Texas form of this species, which has most of the leaves alternate rather than opposite or verticillate. However, the position of the leaves appears to be variable and perhaps not significant. Plants with alternate leaves are also commonly found in Mexico, and one such is Ionidium gracile Sessé & Mociño ex Ging. in DC. Prodr. 1: 309. 1824. If plants with alternate leaves are to be segregated then the epithet gracile has priority over linearis.

BOOK REVIEWS

Alma L. Moldenke

"THE BOLETTI OF NORTHEASTERN NORTH AMERICA" by Walter H. Snell & Esther A. Dick, xii & 115 pp., 87 plates. J. Cramer, Lehre, Germany, or Stechert-Wafner Agency, Darien, Connecticut 06826. 1970. DM 200, £ 29, 18s, or \$55.00.

Such a beautiful, valuable work that it will be desired by many! Such an expensive book that it may have to be bypassed by many lovers of fungi generally and mushrooms specifically, of collections of artistic plates, and of exotically attractive books! For those who can garner the marks, pounds, or dollars there is a wonderful treat in store. Basically following Singer's classification, 138 species and subspecies in 15 genera of the Strobilomycetaceae and the Boletaceae are effectively keyed, described and given both geographic and ecologic distribution. Their edibility is considered. There are 16 plates with outline drawings of spores, cystidia (mostly cheilocystidia) and basidia. There is a good bibliography and index. Then there are those 72 truly magnificent, natural size, natural color plates with over 400 paintings by the senior author on them.

This work represents the only modern publication in this area and a professional lifetime of skilled effort. It is regretted that the still commonly used scientific synonyms and common names are not included since this book will surely appeal to many more than the professional and student mycologists. It is a must for colleges, universities, botanical and related institutions and all better libraries both public and private.

"INTRODUCTION TO NATURAL SCIENCE, Part Two: THE LIFE SCIENCES" by V. Lawrence Parsegian, Paul R. Shilling, Floyd V. Monaghan & Abraham S. Luchins, xv & 727 pp., illus., Academic Press, London and New York, New York 10003. 1970. \$10.95.

"TEACHER'S GUIDE to Introduction to Natural Science, Part Two: THE LIFE SCIENCES" by V. Lawrence Parsegian, ix & 101 pp., Academic Press, London & New York, New York 10003. 1970. \$.75 paperback.

"LABORATORY SUPPLEMENT to Introduction to Natural Science, Part Two: THE LIFE SCIENCES" by V. Lawrence Parsegian, Paul R. Shilling & Floyd V. Monaghan, vii & 105 pp., illus., Academic Press, London & New York, New York 10003. 1970. \$2.95 paperback.

This well coordinated set of books represents a great deal of careful planning for a semester course at the beginning college

level for majors and non-majors who have had a preliminary semester of training in the physical sciences. Actually the material is carefully enough explained not to be dependent upon that course.

As part of the trend of this day the content is primarily biochemistry and human neural physiology. Of course, much of value can be learned from this orientation, but there is almost nothing of a holistic approach to the world of living plants and animals until the next to the last chapter which is devoted to ecology. There is no mention of any part of biosystematics. The book is modestly illustrated. Page 41 shows three good black/white photographs of the stele of root, stem and leaf but with no identification of the plant(s) involved; many texts tend to be careless in this way. Questions at the ends of the chapters are often intelligent. The realistically short bibliographies there are also good, but references to several common important works were missed, such as to Ehrlich's work in the ecology chapter.

The "Teacher's Guide" should be particularly helpful to beginning instructors.

The "Laboratory Supplement" is well organized and suggests some interesting activities. It supplements the text well.

"ELSEVIER'S DICTIONARY OF HORTICULTURE in Nine Languages -- English, French, Dutch, German, Danish, Swedish, Spanish, Italian, Latin" edited by J. Nijdam, xvi & 561 pp., Elsevier Publishing Company, Box 211, Amsterdam; Barking, England; New York, New York 10017. 1970. \$26.00.

Compiled under the auspices of the Ministry of Agriculture and Fisheries at the Hague, this useful dictionary offers one more language - Italian - than the 8-language "Horticultural Dictionary" of 1961 - and now out of print - from the Dutch State Publishing Company. There are 4240 numbered entries with English as the lead language followed by separate listings of each of the other languages. Continued use of the same numbers throughout all nine lists provides for handy cross-referencing. There is a 40 percent increase of terms in this dictionary edition.

Of the terms selected for listing the editor and collaborators claim "all those in any way concerned with [general] horticulture on an international basis will find this publication an indispensable tool." True, indeed!

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 21	March, 1971	No. 2
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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
or \$8, at close of volume

MAR 8 1971

MISCELLANEOUS ADDITIONS AND REVISIONS TO THE FLOWERING PLANTS
OF JAMAICA II

C. D. Adams

ANTHURTIUM (ARACEAE)

ANTHURTIUM MANCUNIENSE C. D. Adams, sp. nov.

A. venosi Griseb. affine sed foliorum laminis majoribus plerumque cordatis sinibus latis vel truncatis et viridibus impolitis; spatha rigide erecta spadicem plus minusve aequantem differt.

Herba terrestris vel rupestris perennis glabra; rhizoma crassa erecta demum parce ramosa radicis crassiusculis adventitiis. Prophylla elongato-ovata carinata apicibus apiculatis vel aristatis usque ad 20 cm longa et 9 cm lata ubi complanata. Petioli solidi adaxiale plani vel parum sulcati abaxiale rotundati 12-30 cm longi. Foliorum laminae ovatae vel lanceolatae, basi cordatae sinibus latis vel truncatae, apice acutae vel obtusae apiculatae, nervis e basi palmatis in paribus duobus tribusve et e costa pinnatis utroque circa sex, coriaciae, virides impolitaе subtus leviter pallidiores, 25-57 cm longae, 13-38 cm latae. Scapus robustus teres, 9-20 cm longus. Spatha oblongo-ovata apice navicularis rigide erecta, initio rubella postea olivacea vel viridis, 6-16 cm longa usque ad 8 cm lata. Spadix oblongus plus minusve decrescens fumosus, 7-16 cm longa. Perianthium 2 mm longum, 2-2.5 mm latum. Filamenta oblanceolata. Fructus baccatus succulentus oblongus proximale albus distale purpureus, 7-8 mm longus, ca. 4 mm latus, ubi perfectus 2-seminalis in pulpa mucilagina, e perianthio extrusus et ad maturitatem carpophoro filiformi pendulus. Semina plano-convexa, 4-5 mm longa, 2.5-3 mm lata, ochracea.

Type Collection: Wm. Harris 8833 (holotype UCWI), growing in crevices of precipitous honey-combed rocks, near Troy, Trelawny Parish, Jamaica, elev. ca. 2000 feet, 6 December 1904.

Paratypes: G. R. Proctor 9952 (IJ unicate), on partly shaded limestone ledge, Tyre District, 2 miles north of Troy, Trelawny Parish, Jamaica, elev. ca. 1750 feet, 14 March 1955; C. D. Adams 6095 (UCWI unicate), on limestone cliff in forest, Oxford Caves to Balaclava junction, Manchester Parish, Jamaica, elev. 700 feet, 7 January 1960; G. R. Proctor 22975 (IJ), shaded limestone cliff, vicinity of Auchtembeddie, Manchester Parish, Jamaica, elev. ca. 1750 feet, 1 December 1962; C. D. Adams 12443 (UCWI), on steep cliff, Cockpit, ca. 5 miles north-west of Troy, Trelawny Parish, Jamaica, elev. 1750 feet, 4 April 1963.

Specimens of this species were earlier determined as A. grandifolium (Jacq.) Kunth and later as A. venosum Griseb.; it

differs from both these in the rigid erect boat-shaped spathe which is about as long as the spadix. It is restricted in its present known distribution to a small area near where the boundaries of the parishes Trelawny, Manchester and St. Elizabeth meet.

DENDROPANAX (ARALIACEAE)

DENDROPANAX OVALIFOLIUS (Fawcett & Rendle) C. D. Adams, comb. nov.

Gilibertia ovalifolia Fawcett & Rendle in Journ. Bot. 64: 158. 1926. TYPE: Harris 9188, Lapland, near Catadupa, St. James, Jamaica.

This new combination is the result of re-appraisal of the value of the character of the articulation of the peduncle. When given greater weight this feature relates D. elongatus Britton and D. ovalifolius closely to D. pendulus (Sw.) Decne. & Planch. The number of flowers in an umbel is regarded as a feature greatly affected by the age of the plant so that D. elongatus goes into the synonymy of D. pendulus while D. ovalifolius can be separated on the basis of leaf-shape.

DENDROPANAX NUTANS (Sw.) Decne. & Planch. var. OBTUSIFOLIA C. D. Adams, var. nov.

Folia apice plerumque obtusa vel rotundata vel raro subacuta.

Type Collection: C. D. Adams 10693 (holotype UCWI; isotype BM), Blue Mountain Peak, St. Thomas Parish, Jamaica, elev. 6800 feet, 18 February 1962; "Tree 20 feet with crooked thick twigs."

Although the type specimen of this variety was made from a gnarled tree with clustered rather small leaves and short inflorescences, the fact that the obtuse-leafed variant occurs also in company with var. nutans in several parts of the range suggests that it is not merely an ecad of exposed situations. There is some purpose in establishing a name for this variety, but in view of the lack of knowledge of causes of variation in the genus and the close affinities of most of the Jamaican species, it might be misleading to cite paratype and other specimens.

FIMBRISTYLIS (CYPERACEAE)

FIMBRISTYLIS HARRISII (Britton) C. D. Adams, comb. nov.

Stenophyllus harrisii Britton, Torreya 20: 83. 1920.

TYPE: Harris 12890, Old England Falls, Blue Mountains, Portland, Jamaica.

This rare and local plant is characterized by its dense tufted growth consisting mainly of numerous slender scapes subtended by reduced leaves. Inflorescences are small of few spikelets and nearly always viviparous. Besides the type locality, it is known from exposed hillsides on serpentine in the area of Arnully, St. Thomas parish (Adams 12224, BM, Mo, UCWI) in association with a number of other very rare plants in Jamaica including

Rhynchospora lindeniana Griseb., Phoradendron anceps (Spreng.) Krug & Urb. and Polystichum tridens (Moore) Fee. There are many species in common with Cuba and Hispaniola in this local flora and Fimbri-stylis harrisii may not be different from Bulbostylis subefimbriata Kükenth. William Harris collected further specimens of this species from the type locality on 3 March 1919; some of the duplicates of this gathering which were distributed to other herbaria were numbered 12098; the specimen in herb. UCWI is numbered 12908 and this is likely to be correct assuming chronological numbering as the type (12890) was collected on 4 September 1918.

LOBELIA (CAMPANULACEAE)

LOBELIA CALEDONIANA C. D. Adams, sp. nov.

L. assurgentis L. affinis sed foliorum marginibus proximalibus integris distalibus crenatis, capsulis non mutantibus; a L. fawcettii Urb. corolla pubescenti differt.

Frutex caule flexili usque ad 1.5 m altus; latex copiosus albus erubescens. Folia oblanceolata basi anguste cuneata integrae apice acuminata crenatae membranacea tenuiter pubescentia usque ad 28 cm longa et 7.5 cm lata, distincte petiolata. Inflorescentia subterminalis subscaposa unilateralis pubescens scapo 5-7 cm longo pedicellis numerosis ca. 18 mm longis rectis, bracteis linearibus ca 1 cm longis, bracteolis linearibus ca. 5-7 mm longis. Ovarium turbinatum 6-7 mm longum. Sepala linearia minute remoteque dentata ca. 13 mm longa. Corolla initio curvata longe secedens 4-4.5 cm longa pallide viridis. Stamina filamenta et tubus ca. 28 mm longa albido-viridia, antherae inaequales curvatae barbatae 8-11 mm longae. Stylus staminibus longior. Capsula cyathiformis diaphragmate apicali dehiscenti ca. 7-9 mm lata. Semina pallida pyri-formia 0.7-0.8 mm longa.

Type Collection: C. D. Adams 12547 (holotype UCWI; isotypes BM, GH), on limestone rocks in montane woodland, Mount Caledonia, Portland Parish, Jamaica, elev. 4600 feet, 19 May 1963 (plant in flower).

Paratypes: C. D. Adams 11629 (UCWI unicate), type locality as above, 5 September 1962 (plant in fruit); W. R. Anderson & D. C. Sternberg 3295 (DUKE, UCWI), type locality as above, 26 July 1966 (plant in fruit).

This new species falls close to L. assurgens L. from which it differs in having the proximal margins of the leaves entire rather than furnished with filiform appendages; the stem is not winged by decurrent leaf-bases; the pedicels are not recurved in fruit. It also resembles L. fawcettii Urb. but the corolla is pubescent.

PALICOUREA (RUBIACEAE)

PALICOUREA WILESII C. D. Adams, sp. nov.

P. pulchrae Griseb. affinis sed corolla brevior pallidior-
que et *P. crocea* (Sw.) Schult. sed foliis plerumque glabris et
corolla longiore nunquam rubra vel aurantiaca.

Frutex 1.2-4 m vel arbor usque ad 5 m alta plerumque glabra.
Folia late lanceolata basi cuneata apice acuminata extremum acuta,
8-22 cm longa, 3-7.5 cm lata nervis lateralibus utroque latere 8-14.
Petioli 1-2 cm longi. Stipulae subpersistentes in situ marcescentes
dentibus binatis distantibus subulato-lanceolatis 3-5 mm longis.
Inflorescentia minute puberula ramis malvinis purpurascens
raro flavidis; bracteae subulatae. Calycis tubus 1 mm longus
segmenta deltata 0.4-0.5 mm longa. Corolla omnino 11-19 mm longa
lobis 2-3 mm longis alba malvina magentea. Fructus laevis niger
5-6 mm longus latusque in sicco bilobatus.

Type Collection: J. Wiles (holotype BM).

Paratypes: Wm. Harris 5203 (BM, UCWI), Claverty Cottage,
Portland Parish, Jamaica, 6 June 1894; Wm. Harris 5180 (UCWI),
Whitfield Hall, St. Thomas Parish, Jamaica, 2 June 1894; Wm. Harris
6312 (BM, UCWI), Whitfield Hall, St. Thomas Parish, Jamaica, elev.
2000 feet, 20 May 1896; W. R. Maxon 8678 (BM), on rocky forest
slope, Flamstead, St. Andrew Parish, Jamaica, elev. 1000-1100 m, 31
May 1926; G. L. Webster & K. A. Wilson 5139 (BM, IJ), John Crow Mts.
Portland Parish, Jamaica, elev. 1000-1500 feet, 6 August 1954;
C. D. Adams 7475 (BM, DUKE, UCWI), in woodland, Greenwich Bridle
road, St. Andrew Parish, Jamaica, elev. 3700 feet, 6 July 1960; also
C. D. Adams 7486 (M, UCWI), 7910 (M, UCWI), 9383 (UCWI), 11926 (BM,
UCWI), 13237 (UCWI); M. duQuesnay 324 (UCWI); J. K. New (UCWI);
G. R. Proctor 8076 (IJ), 23278 (IJ).

This species is rather common in submontane woodlands on shale
or limestone in eastern Jamaica. *Palicourea pulchra* Griseb., also
endemic, is its vicariant in central and western parishes. The
affinity of both these species is with the widespread *P. crocea*
(Sw.) Schult. from which they differ in having larger corollas never
orange or red. *P. crocea* is almost always quite markedly hairy in
Jamaica although towards the southern part of its range it becomes
glabrous; S. Moore in Fawcett & Rendle, Flora of Jamaica, Vol. 7
referred the plant now being described as *P. wilesii* to *P. riparia*
Benth. but that is generally regarded as representing the southerly
variants of *P. crocea*.

The collector, James Wiles, accompanied Capt. Bligh on his
second trip to the Pacific as a gardener. On returning to the West
Indies Wiles was charged with the duty of establishing the bread-
fruit plants first in St. Vincent and then in Jamaica which he did
successfully.

PSYCHOTRIA (RUBIACEAE)

PSYCHOTRIA DOMATIATA C. D. Adams, sp. nov.

P. corymbosae Sw. aliquantum simile sed foliis ellipticis basi late cuneatis et corolla alba.

Frutex puberulus 2-2.5 m altus vel arbor usque ad 6 m alta. Folia obovato-elliptica vel elliptica basi late cuneata apice breviter acuminata 4-17 cm longa 2-7 cm lata nervis lateralibus utroque latere 7-11 subtus axillis caespitoso-pilosis pallidiora nervo medio rubello. Petioli usque ad 3 cm longi. Stipulae subpersistentes in situ marcescentes dentibus binatis deltatis 2 mm longis. Inflorescentia puberula pedunculo viridi vel rubiginoso 2-9.5 cm longo; bractae bracteolaeque lanceolato-subulatae. Calycis segmenta ovata 0.6 mm longa ciliata. Corollae tubus 3-4 mm longus tomentosus eburneus. Fructus drupaceus atro-purpureus in sicco bilobatus 5 mm longus et 6 mm latus.

Type Collection: C. D. Adams 9375 (holotype UCWI, unicate), in wet forest on limestone, Ecclesdown, Portland Parish, Jamaica, elev. 1750 feet, 29 March 1961 (plant in flower).

Paratypes: H. A. Osmaston 5175 (BM, UCWI), in dense mossy thicket, uppermost part of Big River, above Spring Valley Estate, Portland Parish, Jamaica, elev. 3000 feet, 6 August 1967 (plant in flower); also R. A. Howard, G. R. Proctor & Wm. T. Stearn 14757 and G. R. Proctor 10464.

This new species resembles Psychotria corymbosa Sw. but has elliptical leaf-blades broadly cuneate at the base. Although the inflorescence sometimes is tinged reddish, it does not have the characteristic bright mauve or purple coloration of P. corymbosa and the corolla is white.

PSYCHOTRIA PEDUNCULATA Sw. var. CAUDATA C. D. Adams, var. nov.

Folia apice caudato-acuminata. Inflorescentiae pedunculus rami calyx corollaeque pubescens.

Type Collection: C. D. Adams 7296 (holotype UCWI; isotypes BM, GH), Aenon Town to McKoy, Clarendon Parish, Jamaica, elev. 2000 feet, 26 June 1960; "Tree 15 feet; corolla yellow except inside of lobes white."

Paratypes: C. D. Adams 9454 (UCWI), Union Hill, Moneague, St. Ann Parish, elev. 1400-1500 feet, 25 June 1961; "Small tree to 20 feet; corolla very pale yellow; flower-buds yellow."; H. A. Osmaston 5017 (BM, UCWI), steep forested cockpit sides, Jericho-Garlands road, Maroon Town, St. James Parish, Jamaica, elev. 1800 feet, 12 July 1967; "Understorey shrub 2 m high; corolla white." M. duQuesnay 312 (UCWI), woodland margin, Aenon Town to McKoy, Clarendon Parish, Jamaica, elev. 2000-2500 feet, 28 April 1970; "Tree 15-20 feet; corolla white; buds pink-brown."

This new variety differs from typical Psychotria pedunculata

in having the whole inflorescence including the corollas pubescent; the tips of the leaves have a rather long acumens.

RANDIA (RUBIACEAE)

RANDIA ACULEATA L. var. *JAMAICENSIS* (Spreng.) C. D. Adams, comb. et stat. nov.

Gardenia jamaicensis Spreng., Syst. Veg. ed. 16, 1: 761. 1824.

Randia jamaicensis (Spreng.) Krug & Urb. in Urb., Symb. Ant. 1: 426. 1899.

Randia aculeata in Jamaica is extremely variable in leaf-size, hairiness and the presence of spines. This taxon accommodates those variants which have the young vegetative parts and corollas hairy; they do not seem to differ in any other way and thus do not warrant more than varietal rank.

RHYNCHOSPORA (CYPERACEAE)

RHYNCHOSPORA MINUTIFLORA (Rich. ex Spreng.) C. D. Adams, comb. nov.

Scleria minutiflora Rich. ex Spreng., Syst. Veg. ed. 16, 3: 831. 1826.

Rhynchospora micrantha Vahl, Enum. Pl. 2: 231. 1805. nom. illegit.

Vahl described *Rhynchospora micrantha* with *Schoenus rariflorus* Michx. in synonymy. Besides being nomenclaturally superfluous at the time, *R. micrantha* Vahl refers to a distinct taxon next described by Richard as *Scleria minutiflora*. I am grateful to Mr. J. E. Dandy for pointing this out.

RONDELETIA (RUBIACEAE)

RONDELETIA BRACHYPHYLLA G. R. Proctor ex C. D. Adams, sp. nov.

R. hirtae Sw. affinis sed foliis minoribus sessilibus vel subsessilibus basi cordatis differt.

Frutex ramis gracilibus hirtis usque ad 3 m altus vel arbor parva. Folia late ovata basi cordata apice breviter acuminata extremum acutissima 2-9 cm longa 1.5-4.5 cm lata; lamina adaxiale nervo medio hirsuto excepto glabrescens abaxiale venis pilis appressis. Petioli 0.3(-4) mm longi. Stipulae deltato-acuminatae ca. 5 mm longae pilis appressis. Pedunculus usque ad 4 cm longus; pedicelli 0.5-4 mm longi; bractae subulatae. Calycis tubus ovoides 2 mm longus hirsutus segmenta lanceolato-subulata 4 mm longa temeriter pilosa. Corollae tubus 12 mm longus temeriter pilosus coccineus vel viridis lobi orbiculares 4 mm longi distale glabri fulvi. Stylus exsertus vel inclusus. Capsula bisulcata 5 mm longa 6 mm lata temeriter pilosa.

Type Collection: C. D. Adams 12139 (holotype UCWI; isotypes

BM, DUKE), on serpentine rocks, Arntully, St. Thomas Parish, Jamaica, elev. 2900-3000 feet, 24 January 1963 (plant in flower and fruit).

Paratypes: C. D. Adams 13236 (BM, UCWI), type locality as above, 16 July 1970 (plant in flower); also G. R. Proctor 23304 (IJ).

This new species resembles Rondeletia hirta Sw. but is distinguished by the leaves being smaller, sessile or subsessile and cordate at the base. Like many of the Jamaican species of Rondeletia, this plant has a strong tendency to develop crimson coloration in the vegetative parts, especially on the petioles and the undersurfaces of the leaves. The habit of branching is much affected by the physical situation; in the open coppice regrowth develops erect shoots with large leaves; in the shade the branches are straggly and the leaves smaller with often relatively longer petioles.

RYTIDOPHYLLUM (GESNERIACEAE)

RYTIDOPHYLLUM GRANDE (Sw.) Mart. ex G. Don var. LAEVIGATUM C. D. Adams, var. nov.

Foliorum superficies laevigata.

Type Collection: C. D. Adams 6786 (holotype UCWI; isotype BM), collected on open rocks, near Burnt Hill, Trelawny Parish, Jamaica, elev. 1300 feet, 8 April 1960; "Shrubby to 8 feet; leaves mostly distal, lemon-scented; buds sticky; corolla yellow."

Paratype: M. duQuesnay 17 (UCWI), collected in thicket, south of Ramgoat Cave, Trelawny Parish, Jamaica, elev. 1500 feet, 10 December 1968; "Slender tree 11 feet; leaves dark; stems reddish; flowers lemon yellow."

This variety is distinguished from var. grande by the smooth leaves and the usually somewhat less branched inflorescence. Other specimens, e.g. G. R. Proctor 16645, R. A. Howard & G. R. Proctor 14418 and R. A. Howard, G. R. Proctor & Wm. T. Stearn 14656 in herbaria BM, GH and IJ exist but are not available to the author at this time; they originated from the same locality and also extend the range into the parish of St. James.

SCAEVOLA KILAUEAE VAR. POWERSII Deg. & Deg.

Otto & Isa Degener, Volcano, Hawaii

Degener Nos. 21,762 and 21,763, collected at "Keaauhona Forest Reserve, near Pahoa, Hawaii. Among scrub; spreading 2 ft. high bush. Feb. 2, 1952.", comprised such a curious taxon "with robust leaves," that the collector suspected it to be a new variety of Scaevola kilaueae Deg. Yet fearing the specimens might, after all, simply represent plants of the species s.s., especially robust because growing under conditions of exceptional rainfall and rich soil, he left the many sheets lying fallow for nearly twenty years in the herbarium of the "Museum botanicum Berolinense" in Dahlem.

Interest in the above was revived when Dr. Howard A. Powers, geologist stationed on the brink of Kilauea Crater, Island of Hawaii and a keen amateur botanist, drew the attention of the writers to a curious naupaka he had discovered. A few twigs were collected and labeled as follows: "Degener & Degener No. 32,441. X Scaevola kilaueae X S. chamissoniana var. bracteosa Hillebr. Old look out at Pauahi Crater, Haw. Volc. Nat. Park, Hawaii. In scrub at 3,200 feet within 1 meter of S. k. (D. & D. 32,442) & 1 km. of S. c. b. on Puu Huluhulu. Discovered by Dr. Howard Powers. (Collected by Degeners) July 22, 1970."

Because of the resemblance between Nos. 21,762, 21,763 and 32,441, we believe the former two plants represent not a simple hybrid like probably No. 32,441, but rather a more or less constant variety of early hybrid origin. We surmise a plant like No. 32,441 with its limited gene pool, if isolated for a hundred generations or so by surrounding veneers of lava in a kipuka (lava oasis), would de novo evolve into a taxon resembling the new variety described below:

SCAEVOLA KILAUEAE var. POWERSII Deg. & Deg. Frutex 7 dm. altus, ramis ramulisque divaricatus. Folia rigida coriacea, 50 - 85 mm. longa, 12 - 20 mm. lata, marginē 6 - 10 serrato-dentata. Corolla flava. This variety, represented by the type Deg. & Deg. No. 21,763 mentioned above and returned to Berlin for deposit, is intermediate between S. chamissoniana var. bracteosa Hillebr., and S. kilaueae Deg., with features of the latter predominating. For instance, it is a shorter, more spreading shrub than the former taxon. Its leaf size is almost of the former, yet the texture is leathery, with only midrib showing on both surfaces and ribs showing faintly on lower surface. The few serrate-dentate teeth end almost columnar as does the apex of the leaf itself. S. c. var. bracteosa, on the contrary, has subcoriaceous leaves in which ribs and veins are prominent on both surfaces, and the teeth are more numerous and more extensively distributed. The inflorescence in length approaches that of the former; though the flowers are less in number, about 25 mm. long, narrow-lobed, and dull yellowish.

NOTES ON BROMELIACEAE, XXXII

Lyman B. Smith

KEY TO GUZMANIA AND SIMULATORS

This revision follows the same plan as that of Tillandsia in my Notes on Bromeliaceae, XXXI, in Phytologia 20: 121. 1970. It completes preliminary revisions of the major genera of the Tillandsioideae for my monograph, Vriesea having appeared in XXIII in Phytologia 13: 84. 1966, and Catopsis in XXVII in Phytologia 16: 64. 1968. Mezobromelia and Glomeropitcairnia with 2 species each are too small to need preliminary treatment, but there is a strong probability that good corolla material will show the necessity of transferring species now in Guzmania to Mezobromelia.

Several species of Tillandsia and Vriesea and both of Mezobromelia have the flowers polystichous or in more than 2 ranks and can not be distinguished from Guzmania with certainty without good corollas. They are included in this key on the same basis as that of the simulators in the revision of Tillandsia.

Guzmania has groups of species that at first glance appear to be distinct but there are too many intermediates to permit any satisfactory division into subgenera.

1. Sepals exserted, not wholly covered by the floral or primary bracts.
2. Sepals high-connate into a slenderly cylindric tube, the free lobes often conspicuously dilated (Sodirola).
3. Inflorescence very laxly compound. Peru.....G. dudleyi
3. Inflorescence simple, lax to dense.
4. Plants stemless.
5. Inflorescence elongate, lax. .
6. Leaf-blades ligulate...Colombia.....G. sprucei
6. Leaf-blades graminiform. Costa Rica to Colombia.
G. dissitiflora
5. Inflorescence globose or subglobose, dense.
7. Leaf-blades ligulate, usually cross-lined. Panama,
Colombia.....G. musaica
7. Leaf-blades graminiform, concolorous. Colombia, Peru.
G. globosa
4. Plants slenderly long-caulescent; leaf-blades graminiform.
8. Leaf-sheaths nearly concolorous with the blades.
9. Sepals not more than 25 mm long; inflorescence 4-8-flowered. Colombia, Ecuador.....G. graminifolia
9. Sepals 40-55 mm long; inflorescence 10-12-flowered.
Colombia.....G. caricifolia
8. Leaf-sheaths dark castaneous.
10. Scape exceeding the leaves, less than 1 mm thick; scape-bracts mostly shorter than the internodes; inflorescence slenderly ellipsoid and dense before anthesis, becoming lax. Colombia.....G. kalbreyeri

10. Scape shorter than the leaves, over 1 mm thick; scape-bracts always imbricate; inflorescence always dense.
11. Sepals acute; inflorescence 2- rarely 4-flowered.
Colombia, Ecuador.....G. pearcei
11. Sepals obtuse; inflorescence 4-6-flowered.
12. Upper scape-bracts with foliaceous blades exceeding the base of the inflorescence; sepals about 4 cm long with free lobes 15-20 mm long. Costa Rica, Colombia.....G. obtusiloba
12. Upper scape-bracts with short colored blades that do not attain the inflorescence; sepals 7 cm long with free lobes 35 mm long. Colombia.....G. sneidernii
2. Sepals not more than about 1/2 connate and then not forming a slender tube.
13. Spikes lax, at least toward base; flowers and floral bracts divergent to spreading at anthesis; flowers not fasciculate.
14. Inflorescence 3-pinnate or more at least at base.
15. Sepals 17-40 mm long.
16. Floral bracts cucullate; sepals acute, to 18 mm long.
Lesser Antilles, Venezuela.....G. plumieri
16. Floral bracts nearly straight; sepals obtuse.
17. Sepals 35-40 mm long. Ecuador.....G. ecuadorensis
17. Sepals 17-20 mm long. Colombia, Ecuador.....G. bakeri
15. Sepals 8-14 mm long.
18. Leaf-blades broadly or rounded, apiculate.
19. Pedicels slender, equaling or exceeding the floral bracts. Colombia, Venezuela.....G. pennellii
19. Pedicels stout, shorter than the floral bracts.
Colombia.....G. candelabrum
18. Leaf-blades with an attenuate apex.
20. Inflorescence amply pyramidal, lax. Colombia, Ecuador.
G. diffusa
20. Inflorescence thyrsoïd, dense. Costa Rica.
G. condensata
14. Inflorescence not more than bipinnate.
21. Leaf-blades narrowly triangular or graminiform, 7-15 mm wide.
22. Inflorescence simple, lax at base only. Brazil.
V. (63) flammea
22. Inflorescence compound. Colombia.
23. Pedicels distinct, 6-8 mm long; sepals 16 mm long.
G. delicatula
23. Pedicels obscure, the flowers subsessile; sepals 8-11 mm long.
24. Leaves 20-25 cm long, the blades graminiform.
G. bicolor
24. Leaves 13-16 cm long, the blades narrowly triangular.
G. gracilior
21. Leaf-blades linear to ligulate, acuminate to rounded and apiculate, 20-110 mm wide.
25. Sepals acute, 15-40 mm long.

- .26. Leaf-blades broadly acute and apiculate; flowers mostly secund.
- 27. Sepals 40 mm long; branch-axes shorter than the flowers.
Colombia.....G. lehmanniana
- 27. Sepals 18 mm long; branch-axes much longer than the flowers. Lesser Antilles, Venezuela.....G. plumieri
- 26. Leaf-blades attenuate.
- 28. Branches several times longer than the lower primary bracts or the inflorescence simple. Amazonian Brazil, Colombia, Venezuela.....G. brasiliensis
- 28. Branches not more than twice as long as the lower primary bracts.
- 29. Spikes spreading to decurved.
- 30. Floral bracts lanceolate, acute; sepals 32 mm long.
Jamaica.....G. fawcettii
- 30. Floral bracts broadly elliptic; sepals 21 mm long.
Colombia (?).....G. straminea
- 29. Spikes suberect.
- 31. Leaf-blades plicate; sepals 17 mm long. Colombia.
G. stricta
- 31. Leaf-blades not plicate; sepals 24-30 mm long.
- 32. Spikes to 3 cm long, largely covered by the ample primary bracts. Hispaniola.....G. ekmanii
- 32. Spikes to 8 cm long, almost fully exposed by the long but very narrow primary bracts. Colombia...G. pungens
- 25. Sepals narrowly subobtusate to broadly rounded.
- 33. Branches 2-4-flowered; sepals free, coriaceous, even. Costa Rica.....Vriesea spp.
- 33. Branches more than 4-flowered or else the sepals more or less connate or nerved or both.
- 34. Sterile base of at least the terminal branch bracteate or the inflorescence simple.
- 35. Inflorescence compound with all the branches with long sterile bracteate bases much exceeding the primary bracts.
- 36. Sepals 16-18 mm long; sterile base of branch as long as fertile part, 3-4-bracteate. Guiana, Peru, Bolivia.
G. roezlii
- 36. Sepals 10 mm long; sterile base of branch much shorter than fertile part, 1-2-bracteate. Colombia, Ecuador.
G. rhonhofiana
- 35. Inflorescence simple or compound with only the terminal branch with long sterile bracteate base. Costa Rica to Ecuador and Amazonian Brazil.....G. patula
- 34. Sterile bases of all the branches naked and shorter than the primary bracts.
- 37. Sepals not over 10 mm long; spikes few-flowered.
- 38. Primary bracts exceeding the lower branches; sepals nerved; spikes wholly lax. Colombia, Ecuador.
G. multiflora
- 38. Primary bracts much shorter than all the branches; sepals nearly or quite even; spikes lax only at base.

- Venezuela, Peru.....G. venamensis
37. Sepals 16-31 mm long.
39. Branches only 3 cm long, densely flowered except at base, suberect; pedicels stout, 3-6 mm long. Hispaniola.
G. ekmanii
39. Branches 4-23 cm long.
40. Floral bracts orbicular with a triangular apiculus.
Venezuela.....G. steyermarkii
40. Floral bracts with narrower base and broader apex.
41. Primary bracts all distinctly shorter than the branches
42. Sepals free to 3 mm connate, nerved.
43. Pedicels stout, 5-10 mm long; branches ascending, 13-23 cm long. Costa Rica, Colombia..G. costaricensis
43. Pedicels slender, 3 mm long; branches spreading, 6 cm long. Venezuela.....G. nubigena
42. Sepals 5-10 mm connate, even or nearly so.
44. Sepals glabrous. Central America, Colombia, Ecuador.
G. scherzeriana
44. Sepals densely lepidote. Colombia, Ecuador.
G. hitchcockiana
41. Primary bracts equaling or exceeding at least the lower branches.
45. Sepals but slightly exceeding the floral bracts; primary bracts not contracted between base and apex.
Colombia, Ecuador.....G. bakeri
45. Sepals much exceeding the floral bracts; lower primary bracts contracted from a broadly ovate base into a long very narrowly triangular apex.
46. Sepals evenly coriaceous, broadly acute, 21 mm long. Colombia (?).....G. straminea
46. Sepals nerved with membranaceous crisped margins, obtuse, 31 mm long. Colombia.....G. radiata
13. Spikes dense throughout.
47. Floral bracts nearly or quite even or else irregularly rugose when dry as if fleshy and even in life.
48. Floral bracts irregularly rugose when dry; sepals 19-25 mm long.
49. Leaf-blades broadly rounded and apiculate; lower primary bracts suborbicular, apiculate. Ecuador....G. teuscheri
49. Leaf-blades acuminate; lower primary bracts long-acuminate from a broadly ovate base.
50. Inflorescence wholly lax; floral bracts ovate, 15-20 mm long. Venezuela.....G. virescens
50. Inflorescence dense at least toward apex; floral bracts broadly elliptic, 10 mm long. Ecuador, Peru.
G. weberbaueri
48. Floral bracts not at all rugose.
51. Inflorescence densely digitate or subglobose, bipinnate.
52. Leaves and scape-bracts irregularly nodose-septate.
Ecuador.....G. septata
52. Leaves and scape-bracts even except for the nerves.
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53. Sepals acute; leaf-sheaths usually finely purple-striped..
Costa Rica, Panama, Colombia.....G. subcorymbosa
53. Sepals obtuse; leaf-sheaths not striped.
54. Floral bracts and sepals pale; sepals connate for 3 mm;
leaves usually with dark cross-bands. Amazonian
Colombia and Brazil.....G. vittata
54. Floral bracts and sepals dark; sepals about half-connate;
leaves concolorous except extreme base. Colombia.
G. confusa
51. Inflorescence elongate and lax at least at base, or simple.
55. Sepals 32 mm long.
56. Inflorescence compound. Venezuela.....G. hedychioides
56. Inflorescence simple. Mexico.....Vriesea (217) malzinei
55. Sepals 11-18 mm long.
57. Terminal branch with a long sterile bracteate base or the
inflorescence simple.
58. Scape-bracts imbricate. Panama.....G. fillorum
58. Scape-bracts shorter than the upper internodes at least.
Costa Rica to Ecuador and Amazonian Brazil....G. patula
57. Terminal branch with a short naked sterile base like the
lateral ones, inflorescence bipinnate.
59. Sepals 18 mm long; leaf-blades densely lepidote through-
out. Ecuador.....G. lepidota
59. Sepals 11-13 mm long. Colombia, Venezuela.
G. sphaeroidea
47. Floral bracts strongly and regularly nerved.
60. Inflorescence simple; leaf-blades narrowly triangular.
61. Leaf-blades densely cinereous-lepidote on both sides.
Bolivia, Paraguay, Uruguay, Argentina.
Tillandsia ixioides
61. Leaf-blades much more densely and conspicuously lepidote
beneath. Brazil.....Vriesea (63) flammea
60. Inflorescence compound or if rarely simple then the leaf-
blades ligulate.
62. Sepals 30-40 mm long.
63. Sepals acute, free. Lesser Antilles.....G. megastachya
63. Sepals obtuse, ca 1/3 connate. Colombia.....G. andreana
62. Sepals 8-20 mm long.
64. Leaf-blades attenuate.
65. Sepals acute, barely exserted.
66. Branches 2-6 cm long, fusiform or ellipsoid; floral
bracts ovate. Panama, Colombia, Ecuador.
G. calamifolia
66. Branches 10 cm long, cylindric; floral bracts truncate.
Colombia.....G. stricta
65. Sepals rounded; from 1/3 to over 1/2 exserted.
67. Sepals 8 mm long. Venezuela.....G. acorifolia
67. Sepals 16-18 mm long. Costa Rica, Panama.
68. Branches 2-3-flowered; floral bracts ecarinate.
G. donnellsmithii
68. Branches 5-12-flowered; floral bracts carinate.
G. zahnii

64. Leaf-blades broadly acute or rounded, apiculate.
69. Inflorescence densely digitate.
70. Sepals broadly obtuse; primary bracts much exceeding the lower spikes. Nicaragua to Panama.....G. compacta
70. Sepals acute; primary bracts about equaling the lower spikes. Colombia.....G. goudotiana
69. Inflorescence elongate.
71. Floral bracts 15-20 mm long.
72. Floral bracts lepidote, very broadly elliptic, rounded. Venezuela.....G. nubicola
72. Floral bracts glabrous, oblong-lanceolate, broadly acute. Colombia.....Mezobromelia bicolor
71. Floral bracts to 9 mm long; glabrous.
73. Spikes globose or thick-ovoid, 25-30 mm long. Colombia, Venezuela, Ecuador.....G. mitis
73. Spikes subcylindric. Colombia.....G. vanvolxemii
1. Sepals wholly covered by the floral bracts or sometimes by the primary bracts or upper scape-bracts when the flowers are fascicled.
74. Flowers spicate or racemose, not fasciculate.
75. Inflorescence compound.
76. Axis distinct; inflorescence pinnate.
77. Branches laxly flowered at least at base; floral bracts nerved.
78. Sepals 8 mm long; inflorescence tripinnate. Peru. G. paniculata
78. Sepals 15-25 mm long; inflorescence rarely more than bipinnate.
79. Leaf-blades very narrowly triangular, 10 mm wide. Brazil.....Vriesea (61) corcovadensis
79. Leaf-blades ligulate, 35-90 mm wide.
80. Branches suberect or ascending; flowers suberect, regularly polystichous; sepals acute.
81. Leaf-blade 90 mm wide, its apex thickened and pungent; sepals narrowly lanceolate. Colombia. G. pungens
81. Leaf-blade 35-50 mm wide, its apex not notably thickened; sepals obovate. Ecuador. G. xanthobracteae
80. Branches spreading; flowers becoming decurved-secund; sepals obtuse.
82. Primary bracts about equaling the lower branches. Colombia, Ecuador.....G. bakerii
82. Primary bracts much shorter than all the branches. Ecuador.....Mezobromelia fulgens
77. Branches densely flowered throughout.
83. Sepals 30-35 mm long.
84. Primary bracts ample, covering much of each branch. Lesser Antilles.....G. megastachya
84. Primary bracts inconspicuous, covering very little of each branch.
85. Floral bracts broadly elliptic, remaining extended.

- Venezuela.....G. hedychioides
85. Floral bracts oblong-elliptic, each becoming convolute about its axillary flower. Colombia.....G. amplexans
83. Sepals 12-24 mm long.
86. Floral bracts membranaceous, prominently nerved; leaf-blades linear, long-attenuate, 5-25 mm wide.
87. Primary bracts lance-ovate, much exceeding the lower spikes; spikes broadly ovoid. Costa Rica. G. plicatifolia
87. Primary bracts broadly ovate, mostly equaling or shorter than the lower spikes.
88. Inflorescence lax, spikes fusiform or elliptic. Panama to Ecuador.....G. calamifolia
88. Inflorescence dense, spikes globose or stout-ellipsoid. Colombia.....G. goudotiana
86. Floral bracts firm, faintly nerved to even.
89. Sepals acute to acuminate.
90. Spikes slenderly fusiform, attenuate; leaf-blades 15 mm wide. Ecuador.....G. asplundii
90. Spikes broad, obtuse; leaf-blades 40-80 mm wide.
91. Floral bracts acute; spikes sessile, globose.
92. Inflorescence dense throughout; floral bracts nerved. Colombia.....G. densiflora
92. Inflorescence sublux except the extreme apex; floral bracts even or slightly rugulose. Peru.....G. xipholepis
91. Floral bracts obtuse to broadly rounded and apiculate; spikes (at least the lower) distinctly stipitate, longer than wide.
93. Leaves and primary bracts variegated; leaf-blades 50-80 mm wide.
94. Marking of fine dark green wavy cross-lines; inflorescence tripinnate at base. Peru.....G. lindonii
94. Marking of fine red regular stripes; inflorescence bipinnate. Peru, Bolivia.....G. killipiana
93. Leaves and primary bracts not variegated; leaf-blades 40-50 mm wide.
95. Floral bracts even except near apex. Colombia to Suriname and Ecuador.....G. pleiosticha
95. Floral bracts strongly and regularly nerved throughout. Peru.....G. tarapotina
89. Sepals obtuse to broadly rounded.
96. Scape-bracts much shorter than the upper internodes. Peru G. brevispatha
96. Scape-bracts all imbricate.
97. Floral bracts strongly carinate toward apex; sepals 20-24 mm long. Costa Rica to Trinidad and Guiana. Vriesea (184) splitgerberi
97. Floral bracts convex and ecarinate throughout.
98. Scape-bracts castaneous or striped.
99. Scape-bracts castaneous; spikes broadly ovoid, nearly as wide as long. Colombia.....G. cuatrecasasii
99. Scape-bracts striped. Ecuador.

100. Lateral spikes much shorter than the terminal.
G. striata
100. Lateral spikes about equal to the terminal.
G. aequatorialis
98. Scape-bracts green, concolorous.
101. Floral bracts to 27 mm long, densely punctulate-lepidote inflorescence wholly lax. Venezuela.....*G. ventricosa*
101. Floral bracts to 15 mm long, soon glabrous; inflorescence dense toward apex. Costa Rica, Panama.
G. polycephala
76. Axis very short; inflorescence densely digitate.
102. Sepals 30 mm long; floral bracts recurving. Ecuador.
G. osyana
102. Sepals 12-26 mm long; floral bracts erect.
103. Primary and floral bracts uniformly deep red, drying dark brown. Ecuador, Peru.....*G. morreniana*
103. Primary and floral bracts paler, green or bicolorous.
104. Floral bracts acute.
105. Leaves septate; floral bracts coriaceous, even.
Ecuador.....*G. septata*
105. Leaves not septate; floral bracts nerved at least toward apex.
106. Scape-bracts barely imbricate and exposing much of the upper internodes; sepals 12-15 mm long. Colombia.
G. goudotiana
106. Scape-bracts all densely imbricate and wholly concealing the scape; sepals 16-22 mm long. Panama, Colombia.....*G. glomerata*
104. Floral bracts broadly rounded, obtuse or apiculate.
107. Primary bract inconspicuous, the 2 spikes cylindric, 18-27 cm long. Ecuador, Peru.....*G. bipartita*
107. Primary bracts equaling or exceeding, the axillary spikes; spikes 3-8 cm long.
108. Floral bracts coriaceous, even. Colombia, Ecuador.
G. acuminata
108. Floral bracts thin, nerved. Colombia.....*G. eduardii*
75. Inflorescence simple.
109. Leaf-blades narrowly triangular or finely subulate, regularly long-attenuate.
110. Floral bracts firm, coriaceous or subcoriaceous.
Tillandsia spp.
110. Floral bracts thin, membranaceous or papyraceous.
111. Leaf-scales asymmetric with large divergent to spreading basal lobes.....*Tillandsia spp.*
111. Leaf-scales symmetric, appressed or the margin raised slightly all around.
112. Sheaths inconspicuous; blades triangular or crescentiform in cross-section, 5-13 mm wide....*Tillandsia spp.*
112. Sheaths conspicuous, ample, abruptly contracted into the flat blades.
113. Sepals lepidote, 25-35 mm long.....*Tillandsia spp.*
113. Sepals glabrous.

114. Leaf-sheaths dark castaneous, contrasting with the blades
Vriesea spp.
114. Leaf-sheaths concolorous with the blades.
115. Plant stemless or nearly so; posterior sepals carinate.
Mexico, Central America.....Tillandsia brachycaulos
115. Plant caulescent; sepals all convex and ecarinate.
Nicaragua to Ecuador.....G. angustifolia
109. Leaf-blades linear or ligulate, acuminate to rounded and
retuse.
116. Floral bracts firm, coriaceous or subcoriaceous.
117. Sepals 20-35 mm long.
118. Inflorescence polystichous-flowered only at base, above
distichous-flowered. Cuba.
Vriesea (125h) platynema var. wrightii
118. Inflorescence polystichous-flowered throughout.
119. Floral bracts all acute. Ecuador, Peru.....G. conifera
119. Floral bracts, or at least the upper ones, rounded.
120. Inflorescence globose or broadly ellipsoid; sepals
acute. Venezuela.....G. mucronata
120. Inflorescence cylindric; sepals obtuse.
121. Sepals dark castaneous, even, lustrous. Peru.
G. bipartita
121. Sepals stramineous, nerved. Colombia, Venezuela.
G. cylindrica
117. Sepals 11-16 mm long.
122. Floral bracts brown, red, or castaneous at least basally.
123. Leaves retuse; floral bracts orbicular. Colombia,
Venezuela, Bolivia.....G. retusa
123. Leaves not retuse; floral bracts narrower.
124. Floral bracts with a narrowly triangular strongly
nerved green apex. Colombia.....G. triangularis
124. Floral bracts uniform.
125. Floral bracts only slightly exceeding the sepals.
Costa Rica to Venezuela and Ecuador..G. coriostachya
125. Floral bracts about twice as long as the sepals.
Ecuador, Peru.....G. devansayana
122. Floral bracts wholly green or stramineous.
126. Scape-bracts shorter than the internodes; floral bracts
acute. Colombia.....G. pallida
126. Scape-bracts imbricate; at least the upper floral bracts
rounded and apiculate.
127. Leaf-blades rounded and apiculate, covered with pale
appressed scales; flowers about 3-ranked. Panama.
G. filliorum
127. Leaf-blades acuminate; flowers much more than 3-ranked.
128. Sheaths dark castaneous toward base; plant propagating
by short erect stolons. Ecuador.....G. fosteriana
128. Sheaths green with faint stripes; plant without
stolons. Peru.....G. strobilantha
116. Floral bracts thin, chartaceous or membranaceous.
129. Inflorescence fertile throughout.
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130. Floral bracts with divergent apices, to 45 mm long; sepals to 27 mm long. Costa Rica.
Vriesea (105) heliconioides var. polysticha
130. Floral bracts wholly erect and imbricate.
131. Sepals acuminate; floral bracts dark-lepidote. Colombia to Bolivia.....G. calothyrsus
131. Sepals broadly rounded; floral bracts not dark-lepidote.
132. Sepals 15 mm long. Colombia to Bolivia and Amazonian Brazil.....G. melinonis
132. Sepals 20-25 mm long.
133. Upper floral bracts acute or narrowly obtuse. Ecuador
G. bracteosa
133. Upper floral bracts broadly rounded.
134. Sepals coriaceous, dark castaneous; lower floral bracts obtuse; leaf-blades subglabrous. Panama, Greater Antilles.....G. erythrolepis
134. Sepals membranaceous; lower floral bracts broadly acute; leaf-blades densely pale-lepidote beneath. Mexico, Central America.....G. nicaraguensis
129. Inflorescence sterile toward apex.
135. Leaf-blades broadly rounded and apiculate.
136. Sepals 25 mm long, subcoriaceous. Ecuador..G. fuscispica
136. Sepals 12 mm long; membranaceous. Peru.....G. apiculata
135. Leaf-blades acute or acuminate.
137. Sepals firm, coriaceous or subcoriaceous.
138. Bracts of the inflorescence dimorphic, the apical uniformly red, the others pale with dark stripes; sepals to 18 mm long. Southern Florida, West Indies and Nicaragua to northern Brazil and Peru..G. monostachia
138. Bracts of the inflorescence all alike.
139. Sepals 22 mm long; flowers to 60 mm long, exceeding the floral bracts. Panama, Republica Dominicana, Puerto Rico.....G. berteroniana
139. Sepals 12 mm long; flowers 22 mm long, not exceeding the floral bracts. Ecuador.....G. fuerstenbergiana
137. Sepals thin, membranaceous or chartaceous.
140. Leaf-blades densely pale-lepidote beneath. Venezuela.
G. membranacea
140. Leaf-blades subglabrous or obscurely lepidote.
141. Flowers about 3-ranked, barely imbricate. Costa Rica.
G. stenostachya
141. Flowers about 6-ranked, densely imbricate. Ecuador.
G. remyi
74. Flowers fasciculate.
142. Inflorescence compound, the flowers deep in the axils of the large primary bracts.
143. Sepals 40-60 mm long.
144. Fascicles many-flowered. Lesser Antilles..G. megastachya
144. Fascicles few-flowered.
145. Floral bracts ovate, acute, 50-60 mm long; petals violet Ecuador.....G. poortmanii
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145. Floral bracts oblong with membranous dilated apices, 60-80 mm long; petals white. Colombia, Ecuador.
G. wittmackii
143. Sepals 8-33 mm long.
146. Leaf-blades narrowly triangular or subtriangular, long-attenuate; sepals 8-18 mm long.
147. Flowering shoot 20 cm high; leaf-blades 16 mm wide, soon glabrous above; plant caulescent. Colombia.
G. kraenzliniana
147. Flowering shoot 35-55 cm high; leaf-blades conspicuously cinereous-lepidote above.
148. Sepals from slightly to half exerted above the lanceolate floral bracts; leaf-blades densely lepidote on both sides. Colombia, Ecuador.....G. mosquerae
148. Sepals more than half exerted above the suborbicular floral bracts; leaf-blades soon glabrous beneath. Colombia, Venezuela.....G. confinis
146. Leaf-blades ligulate.
149. Flowers not more than 2 in each axillary fascicle; sepals coriaceous, ecarinate.....Vriesea spp.
149. Flowers more than 2 in at least the lower axillary fascicles.
150. Sepals coriaceous, even or at most marginally or apically nerved.
151. Fascicles 10-15-flowered.
152. Pedicels slender, 12-15 mm long. Lesser Antilles.
G. dussii
152. Pedicels short and stout. Greater Antilles to Colombia Trinidad and Peru.....Vriesea (186) capituligera
151. Fascicles few-flowered.
153. Sepals broadly elliptic to suborbicular....Vriesea spp.
153. Sepals lanceolate, their apical third subchartaceous. Colombia.....G. verecunda
150. Sepals uniformly thin and nerved.
154. Primary bracts conspicuously lepidote on at least one side.
155. Lower primary bracts overtopping the center of the inflorescence; scape-bracts white-lepidote on both sides; sepals 18-20 mm long. Colombia to Guyana and Peru.....G. squarrosa
155. Lower primary bracts well exceeded by the center of the inflorescence.
156. Inflorescence subglobose; fascicles 2-5-flowered; sepals 20 mm long. Colombia.....G. palustris
156. Inflorescence elongate; fascicles about 10-flowered.
157. Flowers subsessile; sepals 23 mm long. Venezuela to Ecuador.....G. lychnis
157. Flowers slenderly pedicellate; sepals 33 mm long. Colombia.....G. danielii
154. Primary bracts glabrous or obscurely lepidote.
158. Sepals 22-30 mm long, free or nearly so; fascicles many-flowered.

159. Inflorescence dense; primary bracts suberect.
Colombia, Ecuador.....G. gloriosa
159. Inflorescence lax; primary bracts spreading. Ecuador,
Peru.....G. variegata
158. Sepals 12-14 mm long, high-connate; fascicles few-
flowered. Colombia.
160. Sepal-blades acute; inflorescence sublux; leaf-blades
15 mm wide.....G. longipetala
160. Sepal-blades suborbicular; inflorescence dense; leaf-
blades 20-35 mm wide.....G. sibundoyorum
142. Inflorescence simple, its outer bracts forming a cyathiform
involucre 6 cm or longer that exceeds and conceals the
large flowers.
161. Scape evident; flowers not over 45 mm long; sepals free.
British Honduras and West Indies to Bolivia and Brazil.
G. lingulata
161. Scape lacking; flowers to 70 mm long; sepals connate for 4
mm. Costa Rica, Colombia, Venezuela, Trinidad, Tobago,
and Ecuador.....G. sanguinea

GUZMANIA

Relative to Mez in Engler, Pflanzenreich IV. Fam. 32. 1935.

(Synonymy in separate list following)

- ACORIFOLIA (Griseb.) Mez; Pflr. 631.
- ACUMINATA L. B. Smith, Phytologia 4: 359. 1953.
- AEQUATORIALIS L. B. Smith, Phytologia 6: 435. 1959.
- AMPECTENS L. B. Smith, Contr. U. S. Nat. Herb. 29: 292. 1949.
- ANDREANA (E. Morr.) Mez; Pflr. 626.
- ANGUSTIFOLIA (Baker) Wittm.; Pflr. 611.
- Var. ANGUSTIFOLIA. Floral bracts dark red, sometimes with
dark apices.
- Var. NIVEA L. B. Smith, Phytologia 5: 178. 1955. Floral
bracts pure white.
- APICULATA L. B. Smith; Pflr. 612.
- ASPLUNDII L. B. Smith, Phytologia 6: 436. 1959.
- BAKERI (Wittm.) Mez; Pflr. 625.
- BERTERONIANA (Schult. f.) Mez; Pflr. 611.
- BICOLOR L. B. Smith, Phytologia 13: 457. 1966.
- BIPARTITA L. B. Smith, Phytologia 6: 437. 1959.
- BRACTEOSA (André) André ex Mez; Pflr. 614.
- BRASILSIS Ule; Pflr. 633.
- BREVISPATHA Mez; Pflr. 622.
- CALAMIFOLIA André ex Mez; Pflr. 622.
- CALOTHYRSUS Mez; Pflr. 615. No parenthetical authority
because Beer's name is invalid.
- CANDELABRUM (André) André ex Mez; Pflr. 625.
- CARICIFOLIA (André ex Baker) L. B. Smith, Contr. Gray Herb.
104: 74. 1934.
- COMPACTA Mez; Pflr. 632.
- CONDENSATA Mez & Wercklé; Pflr. 635.
- CONFINIS L. B. Smith, Fieldiana Bot. 28: 143. 1951.

CONFUSA L. B. Smith, sp. nov. A G. vittata Mart. ex Schult. . f.) Mez, cui affinis, bracteis florigeris sepalisque atris, sepalis circa medio connatis, foliis basi ima excepta concoloribus differt.

PLANT stemless, to nearly 6 dm high. LEAVES over 10 in a funneliform rosette, straight, 5 dm long, castaneous at extreme base, otherwise green and concolorous; sheaths broad, 8-10 cm long; blades ligulate, acuminate, 3 cm wide. SCAPE erect, slender; scape-bracts tightly imbricate, the lower foliaceous, the upper lanceolate, acuminate. INFLORESCENCE densely digitate from a few spikes; primary bracts triangular-ovate, attenuate, shorter than the spikes; spikes sessile, broadly ellipsoid, dense, 3 cm long. FLORAL BRACTS suborbicular, shorter than the sepals, coriaceous, even, dark castaneous, obscurely punctulate; flowers subsessile. SEPALS elliptic, obtuse, 11 mm long, like the floral bracts, about half connate, the posterior carinate. Pl. I, fig. 1: Inflorescence; fig. 2: Sepals.

COLOMBIA: VALLE: Cordillera Occidental, western slope: woods, left bank of Río Sanquinín, La Laguna, 1250-1400 m alt, 10-20 December 1943, Cuatrecasas 15496 (VALLE, type; US, photo).

CONIFERA (André) André ex Mez; Pflr. 615.

CORIOSTACHYA (Griseb.) Mez; Pflr. 618.

COSTARICENSIS Mez & Wercklé; Pflr. 635.

CUATRECASASII L. B. Smith, sp. nov. A G. aequatoriale L. B. Smith, cui affinis, scapi bracteis supremis apice excepto atrocastaneis, sepalis subliberis, apice obtuse cuspidatis differt.

PLANT known from only the upper scape and fruiting inflorescence. LEAVES presumably with ligulate blades judging from the form of the scape-bracts. SCAPE straight, ca 6 mm in diameter; scape-bracts densely and tightly imbricate, broadly ovate, dark castaneous except for the short pale apex. INFLORESCENCE densely bipinnate, subglobose, 8 cm long; primary bracts like the upper scape-bracts, slightly shorter than the axillary branches; spikes broadly ellipsoid, 3 cm long, strobilate. FLORAL BRACTS broadly ovate, obtusely cuspidate, slightly shorter than the sepals in fruit, coriaceous, even, dark castaneous; flowers subsessile. SEPALS broadly elliptic, 15 mm long, coriaceous, obtusely cuspidate, subfree, dark castaneous. Pl. I, fig. 3: Inflorescence; fig. 4: Floral bract and sepals.

COLOMBIA: CAQUETÁ: open forest, Cajón de Pulido, gorge of the Río Hacha, eastern slope of the Cordillera Oriental, 1700 m alt, 26 March 1940, Cuatrecasas 8762 (F, type; US, photo).

CYLINDRICA L. B. Smith, *Phytologia* 5: 282. 1955.

DANIELII L. B. Smith, *Phytologia* 4: 360. 1953.

DELICATULA L. B. Smith, *Phytologia* 6: 433. 1959.

DENSIFLORA Mez; Pflr. 622.

DEVANSAYANA E. Morr.: Pflr. 615.

DIFFUSA L. B. Smith, *Caldasia* 5: 2. 1948.

DISSITIFLORA (André) L. B. Smith, *Contr. Gray Herb.* 104: 74. 1934.

DONNELLSMITHII Mez ex Donnell Smith; Pflr. 631.

DUDLEYI L. B. Smith, sp. nov. A G. sprucei (André) L. B.

Smith atque G. dissitiflora (André) L. B. Smith, cuibus affinis, inflorescentia ramosa, sepalis bracteis florigeras valde superantibus, pedicellis conspicuis differt.

PLANT evidently stemless, flowering to 2 m high. LEAVES spreading, 8 dm long, obscurely lepidote throughout; sheaths elliptic, 2 dm long; blades ligulate, acute and apiculate, flat, 65 mm wide, dark green above, red-purple beneath. SCAPE erect, glabrous; scape-bracts erect, the lower subfoliaceous and imbricate, the upper ovate, acuminate, shorter than the internodes. INFLORESCENCE very laxly bipinnate, glabrous; axes red; primary bracts like the upper scape-bracts, shorter than the long sterile bases of the branches; racemes spreading, laxly few-flowered. FLORAL BRACTS obovate, about equaling the pedicels, yellow; pedicels slender, to 13 mm long. SEPALs 35 mm long, more than 2/3 connate in a slender tube, the blades broadly obovate, 9 mm long; petals always (?) included. Pl. I, fig. 5: Lateral raceme; fig. 6: Calyx laid open.

PERU: HUANUCO: common terrestrial plant at Camp 3 (Laguna), in dense cloud forest, southwestern slope of the Río LlullaPichis watershed, on the ascent of Cerro del Sira, 9° 26' S, 74° 45' W, 1290 m alt, 22 July 1969, Dudley 13076 (US, type; NA, isotype); 17 July 1969, Wolfe in Dudley 12347 (US, NA).

DUSSII Mez; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 402. 1953

ECUADORENSIS Gilmartin, Phytologia 16: 166. 1968.

EDUARDII André ex Mez; Pflr. 632.

EKMANNII (Harms) Harms ex Mez; Pflr. 626.

ERYTHROLEPIS Brongn. ex Planch.; Pflr. 614.

FAWCETTII Mez; Pflr. 636.

FILIORUM L. B. Smith, Phytologia 19: 284. 1970.

FOSTERIANA L. B. Smith, Phytologia 7: 107. 1960.

FUERSTENBERGIANA (Kirchh. & Wittm.) Wittm.; Pflr. 613.

FUSISFICA Mez & Sodiro; Pflr. 612.

GLOBOSA L. B. Smith, Phytologia 4: 362. 1953.

GLOMERATA Mez & Wercklé; Pflr. 623.

GLORIOSA (André) André ex Mez; Sm. & Pitt. Journ. Wash. Acad. Sci. 43: 402. 1953.

GOUDOTIANA Mez; Pflr. 630.

GRACILIOR (André) Mez; Pflr. 627.

GRAMINIFOLIA (André ex Baker) L. B. Smith, Contr. Gray Herb. 104: 74. 1934.

HEDYCHIOIDES L. B. Smith, Bromel. Soc. Bull. 5: 69. 1955.

HITCHCOCKIANA L. B. Smith, Proc. Am. Acad. (Contr. Gray Herb. 106:) 70: 148. 1935.

KALBREYERI (Baker) L. B. Smith, Contr. Gray Herb. 104: 74. 1934.

KILLIPIANA L. B. Smith; Pflr. 624.

KRAENZLINIANA Wittm.; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 402. 1953.

Var. KRAENZLINIANA. Sepals 8 mm long; petals 19 mm long.

Var. MACRANTHA L. B. Smith, Phytologia 5: 397. 1956. Sepals 18 mm long; petals over 60 mm long.

LEHMANNIANA (Wittm.) Mez; Pflr. 625.

LEPIDOTA (André) André ex Mez; Pflr. 630.

LINDENII (André) Mez; Pflr. 623.

LINGULATA (L.) Mez; Pflr. 608.

Var. LINGULATA. Plants large. Leaves concolorous; blades more than 25 mm wide. Inflorescence with outer bracts erect, red or pink. Floral bracts strongly cucullate; flowers numerous.

Var. SPLENDENS (Planch.) Mez; Pflr. 609. Plants large. Leaves marked with deep purple longitudinal stripes; blades more than 25 mm wide. Inflorescence with outer bracts erect, red or pink. Floral bracts strongly cucullate; flowers numerous.

Var. CARDINALIS (André) André ex Mez, DC. Mon. Phan. 9: 900. 1896. Leaf-blades 30-40 mm wide. Inflorescence with outer bracts spreading, bright scarlet. Floral bracts strongly cucullate; flowers numerous.

Var. MINOR (Mez) Sm. & Pitt., Phytologia 7: 105. 1960. Plants small. Leaf-blades usually not over 25 mm wide, concolorous with the sheaths. Inflorescence with outer bracts erect, red. Floral bracts weakly cucullate; flowers few.

Var. FLAMMEA (L. B. Smith) L. B. Smith, Phytologia 7: 105. 1960. Leaves 24-34 cm long, exceeding the inflorescence; sheaths castaneous; blades 10-17 mm wide. Inflorescence with outer bracts erect, bright scarlet. Floral bracts weakly cucullate.

LONGIPETALA (Baker) Mez; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 402. 1953.

LYCHNIS L. B. Smith, Phytologia 4: 363. 1953.

MEGASTACHYA (Baker) Mez; Pflr. 620.

MELINONIS Regel; Pflr. 614.

MEMBRANACEA L. B. Smith & Steyermark, Acta Bot. Venez. nos. 5, 6, 7 & 8: 380. 1968.

MITIS L. B. Smith, Contr. Gray Herb. 98: 31. 1932.

MONOSTACHIA (L.) Rusby ex Mez; Pflr. 612.

Var. MONOSTACHIA. Leaf-blades concolorous. Fertile floral bracts pale with dark brown longitudinal stripes.

Var. VARIEGATA hort. ex Nash in L. H. Bailey, Standard Cyclop. Hort. 2: 1419. 1935, nomen illeg.; Foster, Bromel. Soc. Bull. 3: 30. 1953. Leaf-blades longitudinally green- and white-striped. Bracts as in the typical variety.

Var. ALBA Ariza-Julia, Bromel. Soc. Bull. 9: 38. 1959. Leaves concolorous. Floral bracts wholly green, the upper sterile ones pure white.

MORRENIANA (Linden Hortus) Mez; Pflr. 623.

MOSQUERAE (Wittm.) Mez; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 402. 1953.

MUCRONATA (Griseb.) Mez; Pflr. 616.

MULTIFLORA (André) André ex Mez; Pflr. 628.

MUSAICA (Linden & André) Mez; Pflr. 607.

Var. MUSAICA. Leaves marked with fine dark irregular transverse lines.

Var. ZEBRINA Cutak, Mo. Bot. Gard. Bull. 38: 77, 78. 1950. Leaves marked with broad solid bands of color.

Var. CONCOLOR L. B. Smith, Contr. U. S. Nat. Herb. 29: 293. 1949. Leaves concolorous.

- NICARAGUENSIS Mez & C. F. Baker; Pflr. 614.
 NUBICOLA L. B. Smith, Mem. N. Y. Bot. Gard. 9: 316. 1957.
 NUBIGENA L. B. Smith, Phytologia 4: 355. 1953.
 OBTUSILOBA L. B. Smith, Contr. Gray Herb. 104: 74. 1934.
 OSYANA (E. Morr.) Mez; Pflr. 618.
 PALLIDA L. B. Smith; Pflr. 617.
 PALUSTRIS (Wittm.) Mez; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 403. 1953.
 PANICULATA Mez; Pflr. 633.
 PATULA Mez & Wercklé; Pflr. 628.
 PEARCEI (Baker) L. B. Smith, Contr. Gray Herb. 104: 74. 1934.
 PENNELLII L. B. Smith, Contr. Gray Herb. 98: 30. 1932.
 PLEIOTICHA (Griseb.) Mez; Pflr. 621.
 PLICATIFOLIA L. B. Smith; Pflr. 622.
 PLUMIERI (Griseb.) Mez; Pflr. 635.
 POLYCEPHALA Mez & Wercklé; Pflr. 621.
 POORTMANII (André) André ex Mez; Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 403. 1953.
 PUNGENS L. B. Smith, Contr. U. S. Nat. Herb. 29: 293. 1949.
 RADIATA L. B. Smith, Contr. U. S. Nat. Herb. 29: 294. 1949.
 REMYI L. B. Smith, Phytologia 19: 285. 1970.
 RETUSA L. B. Smith, Fieldiana Bot. 28, no. 1: 143. 1951.
 RHONHOPIANA Harms, Notizblatt 14: 329. 1939.
 ROEZLII (E. Morr.) Mez; Pflr. 633.
 SANGUINEA (André) André ex Mez; Pflr. 609.
 Var. SANGUINEA. Leaves to 4 dm long; blades to 55 mm wide. Floral bracts rounded and apiculate, flat. Petal-blades white.
 Var. BREVIPEDICELLATA Gilmartin, Phytologia 16: 164. 1968.
 Leaves mostly not over 20 cm long; blades to 25 mm wide. Floral bracts acute, to 22 mm long, subcucullate; pedicels short.
 SCHERZERIANA Mez; Pflr. 635.
 SEPTATA L. B. Smith, Phytologia 6: 437. 1959.
 SIBUNDOYORUM L. B. Smith, Phytologia 4: 364. 1953.
 SNEIDERNII L. B. Smith, Contr. Gray Herb. 117: 9. 1937.
 SPHAEROIDEA (André) André ex Mez; Pflr. 630.
 SPRUCEI (André) L. B. Smith, Contr. Gray Herb. 104: 75. 1934.
 SQUARROSA (Mez & Sodiro) Sm. & Pitt., Journ. Wash. Acad. Sci. 43: 403. 1953.
 STENOSTACHYA L. B. Smith, Contr. Gray Herb. 117: 9. 1937.
 STEYERMARKII L. B. Smith, Phytologia 7: 419. 1961.
 STRAMINEA (K. Koch) Mez; Pflr. 626.
 STRIATA L. B. Smith, Phytologia 6: 438. 1959.
 STRICTA L. B. Smith, Contr. U. S. Nat. Herb. 29: 297. 1949.
 STROBILANTHA (R. & P.) Mez; Pflr. 616.
 SUBCORYMBOSA L. B. Smith, Contr. Gray Herb. 117: 10. 1937.
 TARAPOTINA Ule; Pflr. 625.
 TEUSCHERI L. B. Smith, Bromel. Soc. Bull. 9: 86. 1960.
 TRIANGULARIS L. B. Smith, Phytologia 4: 364. 1953.
 VANVOLXEMII (André) André ex Mez; Pflr. 628.
 VARIEGATA L. B. Smith, Phytologia 7: 108. 1960.
 VENAMENSIS L. B. Smith, sp. nov. A G. multiflora (André) André ex Mez, cui affinis, bracteis primariis quam ramis multo

brevioribus, spicis base solum laxis, sepalis laevibus vel sublaevibus differt.

PLANT stemless, flowering to 9 dm high. LEAVES numerous, 5-6 dm long, sparsely and finely lepidote; sheaths elliptic, large, castaneous toward base; blades ligulate, broadly acute and apiculate, flat, ca 25 mm wide, concolorous. SCAPE erect, slender, red-violet, sparsely pale-lepidote, soon glabrous; scape-bracts erect, the lower subfoliaceous and imbricate, the upper ovate, acuminate, mostly shorter than the internodes. INFLORESCENCE bipinnate, lax, 8-17 cm long, sparsely pale-lepidote; primary bracts like the upper scape-bracts, all much shorter than the axillary branches but exceeding their naked sterile bases; spikes spreading, ovoid or ellipsoid, 25-40 mm long, dense except at base. FLORAL BRACTS broadly ovate, obtuse, much shorter than the sepals, nearly or quite even; flowers subsessile. SEPALS free or nearly so, elliptic, obtuse, to 10 mm long, the posterior carinate; petals greenish-yellow, the blades spreading, elliptic, 6 mm long, barely exceeding the stamens. Pl. I, fig. 7: Inflorescence; fig. 8: Floral bract and flower.

VENEZUELA: BOLÍVAR: mossy dwarf mountain forest, crest of sandstone cliff, southwestern Cerro Venamo near Guyana line, 1400-1450 m alt, 1 January 1964, Steyermark & Dunsterville 92522 (US, type; VEN, isotype); forested slopes of Cerro Venamo, southeast of km 125, 1200 m alt, 14 April 1960, Steयरmark & Nilsson 108 (US, VEN); rainforest, km 134, El Dorado to La Gran Sabana, 1200 m alt, 19 February 1968, Bunting 2977 (US).

PERU: CUZCO: Convención: epiphyte, dense cloud forest near Camp 2, ca 10 km walking distance northeast of Hacienda Luisiana and Río Apurímac, 1460 m alt, 28 June 1968, Dudley 10561 (NA).

VENTRICOSA (Griseb.) Mez; Pflr. 620.

VERECUNDA L. B. Smith, Phytologia 4: 366. 1953.

VIRESCENS (Hook.) Mez; Pflr. 630.

VITTATA (Mart. ex Schult. f.) Mez; Pflr. 632.

WEBERBAUERI Mez; Pflr. 628.

WITTMACKII (André) André ex Mez; Sm. & Pitt. Journ. Wash. Acad. Sci. 43: 403. 1953.

XANTHOBRACTEA Gilmartin, Phytologia 16: 165. 1968.

XIPHOLEPIS L. B. Smith, Phytologia 9: 248. 1963.

ZAHNII (Hook. f.) Mez; Pflr. 629.

SYNONYMS AND EXCLUDED NAMES

altsonii L. B. Smith, Contr. Gray Herb. 89: 7. 1930 - PLEIO-STICHA.

balanophora Mez; Pflr. 414 - VRIESEA B.

beleana (André) André; Pflr. 631 - VIRESCENS.

brachycephala (Baker) Mez; Pflr. 611 - STROBILANTHA.

capitulata Mez & Wercklé; Pflr. 632 - COMPACTA.

capituligera (Griseb.) Mez; Pflr. 619 - VRIESEA C.

cardinalis (André) Mez; Pflr. 609 - LINGULATA var. C.

columnaris Mez & Sodiro; Pflr. 619 - GLORIOSA.

cornuaultii (André) André ex Mez; Pflr. 423 - TILLANDSIA

TURNERI var. TURNERI.

crateriflora Mez & Wercklé; Pflr. 610 - SANGUINEA.cryptantha L. B. Smith, *Caldasia* [1], No. 5: 6. 1942 -

SQUARROSA.

Var. pauciflora L. B. Smith, *Phytologia* 4: 214. 1953 - SQUARROSA sens lat.dielsii Harms, *Notizblatt* 12: 538. 1935 - WEBERBAUERI.drewii L. B. Smith, *Contr. U. S. Nat. Herb.* 29: 526. 1954 -

BAKERI.

elongata Mez & Sodiro; Pflr. 627 - BAKERI.geniculata L. B. Smith, *Journ. Wash. Acad. Sci.* 42: 282. 1952

- SPHAEROIDEA.

guatemalensis L. B. Smith, *Contr. Gray Herb.* 117: 8. 1937 - SCHERZERIANA.harrisii Mez; Pflr. 619 - VRIESEA CAPITULIGERA.herthae Harms, *Notizblatt* 14: 329. 1939 - SCHERZERIANA.laxa Mez & Sodiro; Pflr. 617 - MONOSTACHIA.micheelii Mez; Pflr. 618 - CORIOSTACHYA.minor Mez; Pflr. 610 - LINGULATA var. MINOR.nigrescens (André) Mez; Pflr. 617 - CORIOSTACHYA.parviflora Ule; Pflr. 617 - STROBILANTHA.platysepala Mez & C. F. Baker; Pflr. 613 - MONOSTACHIA var.

MONOSTACHIA.

rosea L. B. Smith; Pflr. 614 - SPRUCEI.sanguinea var. erecta (André) Mez; Pflr. 610 - unidentifiable, but certainly not in this species.sodirosa Mez; Pflr. 620 - VRIESEA CAPITULIGERA.splitgerberi Mez; Pflr. 621 - VRIESEA SPLITGERBERI.strobilifera Mez & Wercklé; Pflr. 618 - CORIOSTACHYA.superba Suesseng., *Bot. Jahrb.* 72: 290. 1942 - SCHERZERIANA.wrightii L. B. Smith, *Contr. Gray Herb.* 117: 11. 1937 -

VRIESEA PLATYNEMA var. WRIGHTII.

Sodirosa - GUZMANIAandreana Wittm.; Pflr. 600 - GUZMANIA OBTUSILOBA L. B. Smith, *Contr. Gray Herb.* 104: 74. 1934.caricifolia André; Pflr. 602 - GUZMANIA CARICIFOLIA.dissitiflora André; Pflr. 602 - GUZMANIA DISSITIFLORA.graminiflora André; Pflr. 600 - GUZMANIA GRAMINIFOLIA.kalbreyeri Baker; Pflr. 602 - GUZMANIA KALBREYERI.pearcei Baker; Pflr. 600 - GUZMANIA PEARCEI.sprucei André; Pflr. 602 - GUZMANIA SPRUCEI.trianae Mez; Pflr. 602 - GUZMANIA GRAMINIFOLIA.

MISCELLANEOUS NOTES

DYCKIA HEBDINGII L. B. Smith, sp. nov. A D. maritima Baker, cui affinis, foliorum laminis utrinque dense lepidotis, staminibus inclusis, seminis ala apice acuta differt.

PLANT flowering over 1 m high. LEAVES numerous in a dense spreading rosette, ca 15 cm long; blades narrowly triangular,

over 15 mm wide at base, covered with appressed cinereous scales on both sides, subdensely serrate with spreading slender spines. SCAPE erect, slender, about 3 times as long as the leaves; scape-bracts exceeding the internodes but divergent, very narrowly triangular and wholly exposing the scape, serrulate, red. INFLORESCENCE laxly subtripinnate with branches to 30 cm long, densely cinereous-lepidote; primary bracts inconspicuous; spikes many-flowered, subdense to lax. FLORAL BRACTS broadly ovate, apiculate, 5 mm long, much exceeded by the sepals; flowers short-pedicellate, suberect to spreading and sometimes slightly secund. SEPALs ovate, broadly subacute, 4.5 mm long; petals spatulate, obtuse, 7 mm long, yellow; stamens included, free above the 1 mm tube with the petals; style slender, elongate. Capsule 8 mm long; seed with a narrow apically pointed wing. Pl. II, fig. 1: Habit; fig. 2: Leaf; fig. 3: Branchlet; fig. 4: Flower; fig. 5: Sepal; fig. 6: Petal and stamens; fig. 7: Seed.

BRAZIL: RIO GRANDE DO SUL: on rocks, Município Guayoro, Pôrto Alegre, Croizat seed no. 22.495, cultivated and flowered in Jardin Botanique "Les Cedres", September 1970, Hebding in Hortus Marnier-Lapostolle s n (US, type).

PITCAIRNIA BIFARIA L. B. Smith, sp. nov. Ab omnibus speciebus foliis bifariis petiolatis integerrimis, inflorescentia simplicissima, bracteis florigeris superioribus quam pedicellis brevioribus, sepalis obtusis, ovulis alatis differt.

PLANT short-caulescent, flowering 4 dm high. LEAVES uniform, bifarious (distichous), strongly petiolate, entire, very sparsely and inconspicuously lepidote; sheaths narrowly triangular, inconspicuous; blades elliptic, acuminate, cuneate at base, to 30 cm long, 6 cm wide, flat. SCAPE erect, slender; scape-bracts narrowly triangular, long-attenuate, much exceeding the internodes. INFLORESCENCE simple, 13 cm long, lax, secund-flowered, white-lepidote. FLORAL BRACTS from narrowly triangular and exceeding the lower pedicels to ovate and shorter than the upper; pedicels divergent to spreading, slender, to 15 mm long. SEPALs lance-oblong, obtuse, 17 mm long, ecarinate; petals over 25 mm long, deep pink (Dudley), bearing a semiorbicular scale at base; stamens (immature) probably included; ovary more than $\frac{1}{2}$ inferior; ovules alate. Pl. III, fig. 1: Leaf; fig. 2: Inflorescence; fig. 3: Sepal.

PERU: HUÁNUCO: epiphytic in dense and damp cloud forest half way between Camp 3 (Laguna) and Camp 4 (Peligroso), southwestern slope of the Río LlullaPichis watershed, on the ascent of Cerro del Sira, 9° 26' S, 74° 45' W, 1400 m alt, 22 July 1969, Dudley 13087 (NA, type).

PITCAIRNIA WOLFEI L. B. Smith, sp. nov. A P. alborubra Baker, cui valde affinis, pedicellis sepalisque multo minoribus, ovario fere omnino infero differt.

PLANT flowering 6 dm high. LEAVES rosulate, to 1 m long, entire, sparsely pale-lepidote on both sides; sheaths triangular, inconspicuous; blades linear-lanceolate, attenuate, 35 mm wide, prominently nerved and channeled. SCAPE erect, slender, pale-lepidote; scape-bracts erect, the lower large and foliaceous, the

upper small, broadly ovate, much shorter than the internodes. INFLORESCENCE laxly racemose, 8-13 cm long, sparsely white-lepidote. FLORAL BRACTS broadly ovate, acute, 7 mm long, about half as long as the pedicels at anthesis; pedicels spreading, slender, to 12 mm long in fruit. SEPALS narrowly triangular, broadly obtuse, 13 mm long, green; petals obtuse, 35 mm long, greenish white tipped with purple, obscurely and irregularly appendaged; stamens included; ovary ellipsoid, red, almost wholly inferior. FRUIT indehiscent; seeds very narrowly winged. Pl. III, fig. 4: Inflorescence; fig. 5: Sepal.

PERU: HUÁNUCO: terrestrial, in very dark, wet rainforest on the steep sides and bottom of valley just below Camp 4 (Peligroso), southwestern slope of the Río LlullaPichis watershed, on the ascent of Cerro del Sira, 9° 25' S, 74° 44' W, 1535 m alt, 28 July 1969, Frank Wolfe in T. R. Dudley 12404 (NA, type); same, shallow valley just beyond Camp 4 (Peligroso), 1540 m alt, 25 July 1969, Dudley 13293 (NA, US).

RONNBERGIA EXPLODENS L. B. Smith, sp. nov. A R. maidifolia Mez, cui affinis, foliis serrulatis, vaginis amplis, inflorescentia sublaxa differt.

PLANT stoloniferous. LEAVES few, fasciculate, to 7 dm long, much exceeding the inflorescence, serrulate throughout, pale-lepidote beneath; sheaths ovate, ample; blades linear-lanceolate, acuminate, subpetiolate, 7 cm wide, thin, channeled. SCAPE erect slender, white-lepidote; scape-bracts erect and exceeding the internodes, the upper ones linear, attenuate, entire. INFLORESCENCE simple, sublax, 9-11 cm long, white-lepidote. FLORAL BRACTS suborbicular, apiculate, 5 mm long, green; flowers spreading. SEPALS 6.5 mm long with a large suborbicular wing overtopping the mucronulate apex, connate for 4 mm. FRUIT globose, 10 mm long, "upon slightest touch....explodes releasing large quantities of mucilaginous seeds." Pl. III, fig. 6: Inflorescence; fig. 7: Sepal.

PERU: HUÁNUCO: epiphytic (but not more than 1 m above ground) and terrestrial, in dense cloud forest at Camp 3 (Laguna), southwestern slope of the Río LlullaPichis watershed on the ascent of Cerro del Sira, 9° 26' S, 74° 45' W, 1290 m alt, 21 July 1969, Dudley 13063 (US, type; NA, isotype); same, 19 July 1969, 13052 (NA); same, about halfway between Camp 3 (Laguna) and Camp 4 (Peligroso), 1450 m alt, 23 July 1969, 13176 (NA).

Tillandsia atroviridipetala Matuda, Cact. y Sucul. Mex. 2: 53, fig. 40. 1957 - PLUMOSA Baker, Journ. Bot. 26: 13. 1888. Synonymy omitted in Key to Tillandsia, Phytologia 20: 174. 1970.

Because of its filiform-attenuate tomentose-lepidote leaves Tillandsia atroviridipetala belongs in the synonymy of T. plumosa and not in that of T. mauryana (cf. Phytologia 7: 173. 1960) which has stouter leaf-blades with broad scales.

TILLANDSIA NANA Baker, Handb. Bromel. 172. 1889, emend. L. B. Smith, inflorescentia ramosa vel simplici, spicis distiche 2-3-floris, complanatis. T. calocephala Wittm. Meded. Rijks Herb. Leiden 29: 90. 1916.

PERU: INDEFINITE: Gay s n (P, type; GH, photo). AYACUCHO:

Aucará, 20 Feb 1967, Chinchay 3647 (US, USM). CUZCO: Urubamba, Weberbauer 2554 (B, F photo 11517); Caicai, Urubamba Valley, Aug 1926, Herrera 1146 (US); Uno, Calca, Jan 1937, Vargas 238 (GH, LIL); Ollaínta, Urubamba Valley, 1 May 1954, Rauh & Hirsch P-1089 (U); Paucartambo, 8 May 1954, Rauh & Hirsch P-1100 (US); Calca, 29 Dec 1962, Iltis & Ugent 957 (US, WIS).

BOLIVIA: LA PAZ: Murillo, La Paz, 15 Dec 1920, Shepard 234 (GH, US). COCHABAMBA: Chapare (?): Río Montehuaiko, June 1911, Herzog 2300 (L, type of T. calocephala Wittm.; F photo 11484).

Reexamination of the type of Tillandsia nana discloses that the spikes are distichous-flowered and that the species is in no way different from the later T. calocephala. In my key to the genus in *Phytologia* 20: 121. 1970, T. nana should be deleted on page 146 and should replace T. calocephala on page 125.

TILLANDSIA STENOURA var. TRIPINNATA (L. B. Smith) L. B. Smith, comb. nov. T. deppeana var. tripinnata L. B. Smith, *Phytologia* 5: 49. 1954. T. stenoura var. gonzalezii Gilmartin, *Phytologia* 16: 155. 1968. T. fendleri var. fendleri sensu L. B. Smith, *Phytologia* 20: 175. 1970.

ECUADOR: LOJA: páramos west of Saraguro, about 50 km north of Loja, 3° 05' S, 29° 14' W, 2500 m alt, 10 March 1947, Espinosa E-1412 (GH, type of T. stenoura var. gonzalezii Gilmartin).

PERU: SAN MARTÍN: San Roque, Jan-Feb 1930, L. Williams 7199 (F, GH); 7610 (F, GH). HUÁNUCO: Yanano, 1800 m alt, May 1923, Macbride 3766 (F, GH); Huacachi, Muna, May 20 - June 1, 1923, Macbride 4192 (F, GH); subtropical forest, below Carpish, Huanuco to Tingo María, 2300-2400 m alt, 23 June 1953, Ferreira 9410 (US, type; USM, isotype).

My original description of this variety overlooked the character of beaked floral bracts, while the tripinnate nature of the inflorescence proved less important.

VRIESEA CITRINA (Baker) L. B. Smith, comb. nov. Tillandsia citrina Baker, *Handb. Bromel.* 224. 1889. Vriesea citrina E. Morr. ex Baker, *Handb. Bromel.* 224. 1889, nomen in synonym.; *ibid.* (?), *hort. Rev. Hort.* 77: 127. 1905, nomen. Vriesea minarum L. B. Smith, *Arquiv. Bot. Est. S. Paulo* II. 1: 118, pl. 126. 1943.

BRAZIL: MINAS GERAIS: Serra da Piedade, 1500-1550 m alt, Warm-ing 2176 (C, type); 10 July 1940, Foster 564 (GH, type of Vriesea minarum L. B. Smith; US); 27 Mar 1957, E. Pereira 2678 & G. Pabst 3514 (RB); Serra do Curral, Nova Lima, 1 Mar 1934, Mello Barreto 2097 (BHM). INDEFINITE: Sellow 70 (P).

VRIESEA SPLENDENS var. FORMOSA Suringar ex Witte, *Semperv.* 18: [361]. 1889. Tillandsia longibracteata Baker, *Journ. Bot.* 26: 81. 1888. Vriesea splendens var. longibracteata (Baker) L. B. Smith, *Smithsonian Misc. Coll.* 126: 36. 1955; *Phytologia* 13: 116. 1966.

The name "formosa" is the oldest in the varietal category and thus should have been used in my revision of Vriesea in *Phytologia*.

Plate I

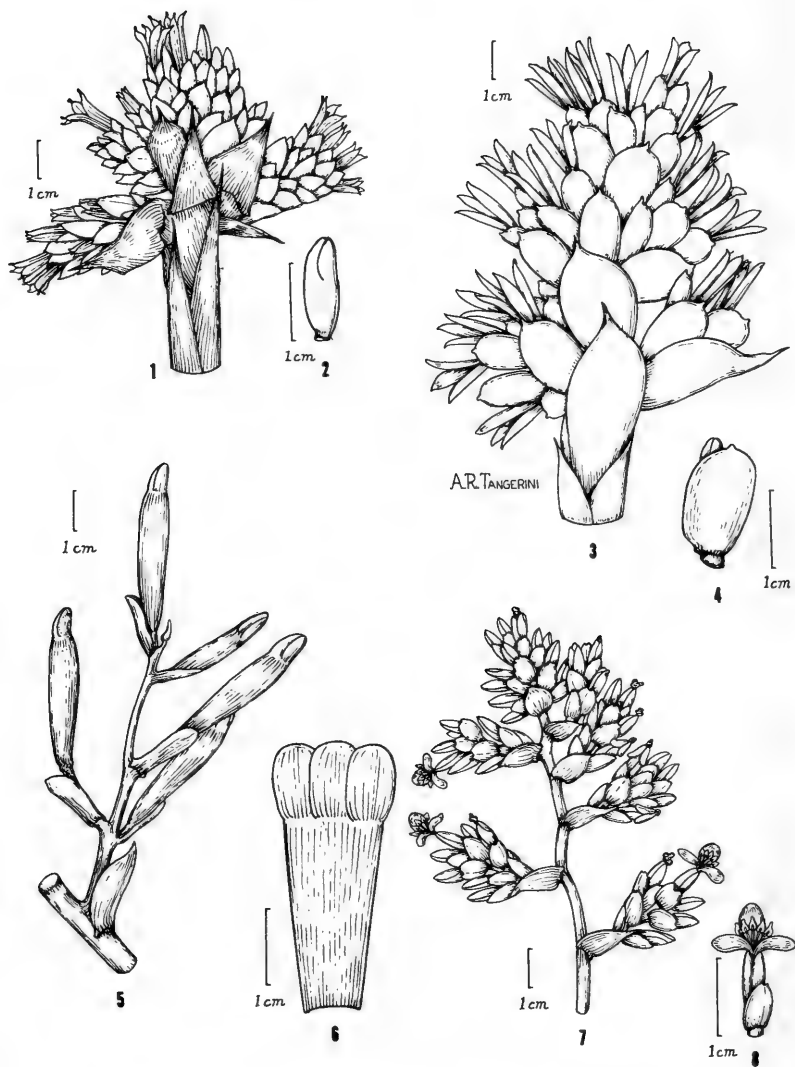


Fig. 1-2: *Guzmania confusa*; 3-4: *G. cuatrecasasii*;

5-6: *G. dudleyi*; 7-8: *G. venamensis*.

Plate II

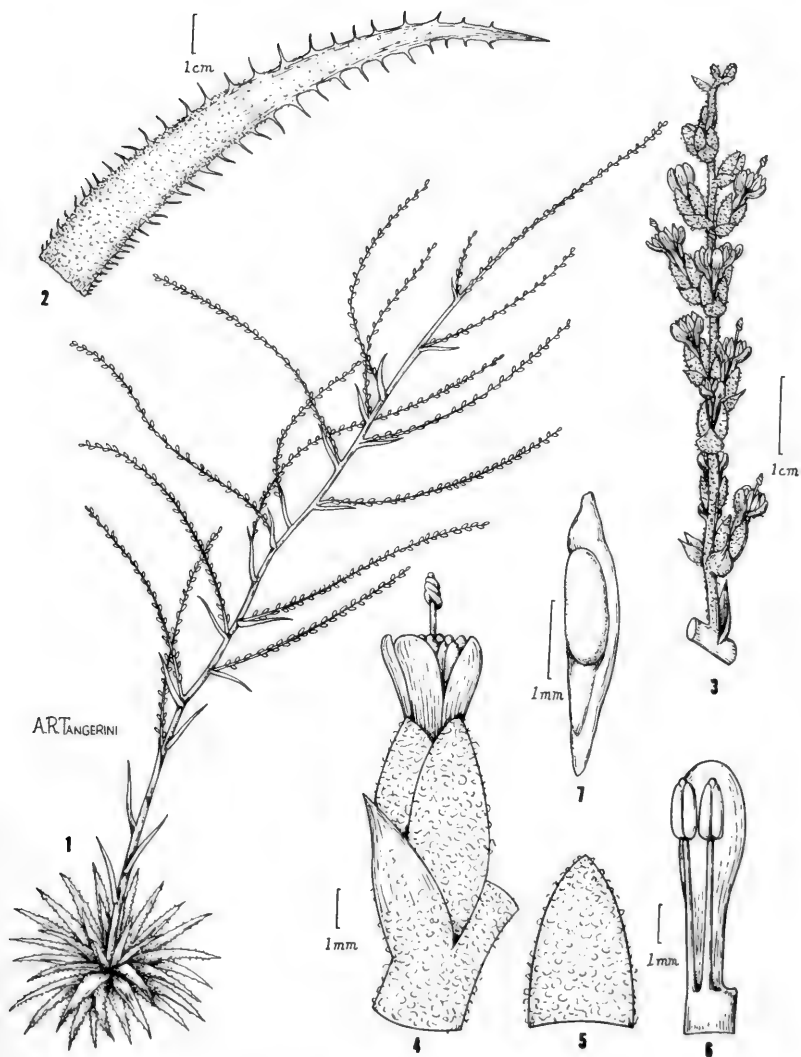
Fig. 1-7: *Dyckia hebdingii*.

Plate III

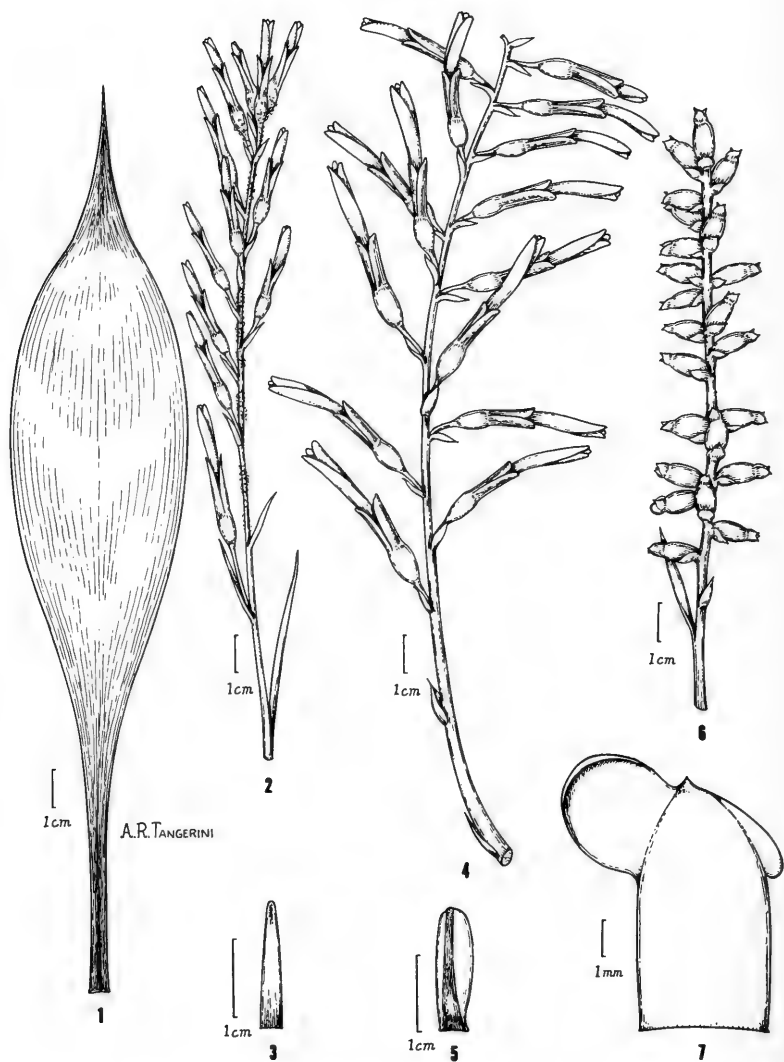


Fig. 1-3: *Pitcairnia bifaria*; 4-5: *P. wolfei*;

6-7: *Ronnbergia explodens*.

NATURAL HISTORY OF THE BONIN ISLANDS

Otto & Isa Degener

The two volume work quaintly entitled "The Nature of the Bonin Islands" and "Compiled by Takasi Tuyama and Shigeo Asami" arrived as a Christmas gift from Dr. Tuyama Professor of Botany, Ochanomizu University, Tokyo. Dr. Tuyama, and Dr. Charles Lamoureux of the University of Hawaii, had visited at our home on the north shore of Oahu some months before with a package of Bonin herbarium specimens for comparison with Hawaiian taxa. A chain-smoker, after our study in the wind-free house, we entertained our foreign guest out of doors, enthralled by his description of his plant exploration in his chosen archipelago, known to the Japanese as Ogasawara-jima. Due to our bombarding the group in August 1943, we may remember that the fifteen or so "larger" islands with a total area of forty square miles, are of volcanic origin and part of Micronesia. They are not low, coral atolls with a monotonous biota.

We have prepared the present review for our peers as neither we, nor you (we surmise) are versed in the Japanese language. The volumes are in board covers, about 7 1/2 inches wide and 10 1/2 inches high, and have an excellent quality of filled paper. The number of pages, shown in Arabic, for Volume I comes to 271; but about a score more unnumbered pages occur with maps showing often on grids elevations, soils, rainfall, etc. The frontispiece is a colored plate of a beautiful aerial scene of the rugged coastline, while following it is a Pacific blue and leaf green two-page spread of the entire archipelago in relief. Nearer the middle of the book and beyond are four colored plates, one depicting nine gaudy marine organisms, such as bryozoons and sea urchins, and the remainder displaying an assortment of 56 typical marine mollusks. Beside a good sprinkling of black and white half-tones of geologic and other diagrams, of photos of plants (some not too clear), of prints of birds, this volume contains 32 full-page additional plates in black and white. These are a mélange of scenes showing the typical vegetation from an understory of Marattia to a shore predominantly of Pandanus; from close-ups of the most interesting Flowering Plants to "land shells," insects, crustaceans and diagrams of the commoner sea birds in flight; and human interest, such as showing Drs. Tuyama and Asami with student assistants, of village scenes, of outrigger canoes, of some World War II ship and 'plane wreckage and, at the very end a monument in good taste flying the Japanese and American flags side by side to the tragic victims of a conflict stimulated by population pressure.

For us, specializing in the Hawaiian flora, Volume I is useful as the scientific names of the Ferns and Flowering Plants (as are those of the animals as well) are given in English, though the descriptions in Japanese are beyond our understanding. We can thus see how closely the two floras approach each other. This hardly pertains to species, excepting for some ferns and some ocean disseminated halophytes like Colubrina asiatica; but certainly to genera.

For the non-specialist, for those unacquainted with the Japanese language, and for those for whom the Bonin Islands are little more than a name, we do not recommend investing in this book.

Volume II is decidedly a "horse of another color." It is truly outstanding! There is no text at all; instead, there are 228 magnificently executed colored plates comprising about 475 separate photographs. Among the first are important views of Chichi-jima, Futami Bay, andesite and marine cliffs, green olivine sand called uguisizuma, agate, Tertiary rocks, semi-fossil snail shells, "Oni-iwa, an ogreish stack," northernmost Haha-jima, pinnacled islets of Harino-iwa, etc. All this is the groundwork for understanding the environment for the Bonin Island biota. Then follow plates 43 to 130 comprising 213 exquisite color photographs of mostly native plants, many so easy to recognize as they or their relatives are likewise found in the better-known Hawaiian Islands. Some of the identical species, for example, appear to be Ipomoea pes-caprae var. emarginata, Cassytha filiformis, Calophyllum inophyllum, Psilotum nudum and Neottopteris nidus. Personally prejudiced in noting the occurrence of the same, uninteresting, horribly beautiful ornaments of gardens the world around threatening a fascinating native flora, we regret Drs. Tuyama and Asami's wasted film on the south-east Asian Melia azedarach, the American Leucaena glauca now found to be actually leucocephala, the American Psidium guajava, the American Cassia (or as we "splitters" prefer, Ditremexa) occidentalis, the African Thunbergia alata and its Indian relative T. laurifolia, the American Schinus terebinthifolius, the American Nicotiana tabacum beloved by Dr. Tuyama, an atypical African Hibiscus schizopetalus with Asiatic admixture, the more southern Codiaeum variegatum hort., the American Allamanda cathartica, the American Poinsettia pulcherrima hort., the East ? Indian Bryophyllum pinnatum, the American Agave americana and a variety of the American Passiflora foetida. We should have so much preferred endemics or even natives instead. But that, of course, is a matter of taste as the old lady maintained when she kissed the cow.

Plates 131 - 134 show magnificently black fruit bats, not unlike the larger brown flying foxes sampled broiled in Fiji by one of the reviewers; the diminutive deer Cervus mariannus (note double "n"), fleeing feral goats; and an example of erosion described as "Patches of grassland, result of cattle-bite." The nine plates following of birds will delight the viewer whether he be ornithologist or not. Another plate shows the toad Bufo marianus (note single "n"), not to be confused with the Cuban toad B. marinus naturalized in the Hawaiian Islands. Four plates are devoted to colorful insects; about 25 to intricate corals, overlapping somewhat with about as many plates devoted to fishes and marine invertebrates. The last dozen or so are of human interest: scenes of a model village, a meteorological station, a Christian (!) church, a school, shipping of specimens and ships, a scene of the Metropolitan Governor giving an address, and very appropriately at the very last a solemn "Monument of the war dead, Iso-jima." One question, however, bothers us. Where are the native Micronesians? Did all fall victims to the horrors of war, or were they evacuated never to return?

Pictures are well nigh a universal language; and Volume II consists only of these, each with captions in Japanese and English. This book we highly recommend to the geologist, to the professional botanist specializing in plants of the Pacific, to the general botanist interested in the plant world as a whole, to zoologists of various disciplines, to the armchair traveler, and to the Veterans of World War II who now can show their families and friends the type of islands they defended with devastation and how Nature in about thirty years healed the scars of human conflict.

From the Japanese blurb we cannot tell the price of the work, nor whether sets can be broken. Due to the excellence of Volume II, we hope the Hirokawa Publishing Company, 27 - 14, Hongo - 3, Bunkyo-ku, Tokyo, Japan, will soon publish an English translation of Volume I for the sake of reaching a wider reading public.

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BOOK REVIEW

Otto Degener

A Russian book in the field of Taxonomy is now available to us English readers through the authorized translation by C. Jeffrey, Senior Scientific Officer, Kew, England, of a work by Armen Takhtajan, Botanical Institute of the Academy of Sciences, Leningrad.

Dr. Takhtajan's "Flowering Plants, Origin and Dispersal" was published by Oliver & Boyd, Edinburgh, in 1969, and sells for £ 2.50. It comprises 310 pages of which 31 are devoted to the Bibliography ("Scottsberg" should read "Skottsberg") and 26 to the Index. Though this leaves but 253 pages for text, this is packed with information illustrated with 13 plates and 32 figures.

Chapter 3 begins with long established convictions held by many of us that "The identity of the ancestors of the flowering plants is a most difficult problem - - -", and that "In spite of their great diversity, all seed plants have so much in common that their origin from more than one ancestral group seems unlikely." Takhtajan then concludes, in agreement with many other workers, that the angiosperms arose from some very ancient group of gymnosperms having primitive secondary xylem of scalariform tracheids and primitive bisexual strobili. These last must have been large; terminal; and with an elongate axis bearing spirally arranged leafy bracts and leaf-like, pinnate sporophylls. The microsporangia and ovules were numerous; the microsporangia free and the ovules without a micropyle. The strobili in most cases were cross-pollinated by insects such as beetles. The carpel may have evolved as an organ of great survival value, protecting the large ovule from being eaten and in general enabling it to become reduced in size.

The mysterious absence of fossil remains of the earliest flowering plants is explained as probably due to such groups having evolved rapidly in montane regions where conditions for fossilization were far less favorable than in the lowlands where sediments tended to accumulate.

Chapter 6, the longest, builds the first flowering plants via a hypothetical reconstruction. Then follow "Living Fossils." These, according to the author, are the Magnoliales, comprising the Winteraceae, Magnoliaceae, Degeneriaceae, Himantandraceae, Eupomatiaceae, Annonaceae, Canellaceae and Myristicaceae. Next are characterized various families, somewhat reminiscent to us English readers of Arthur J. Eames' "Morphology of the Angiosperms," published seven years after Takhtajan's "Origin of Angiospermous Plants" and the same year as the latter's second edition.

Authentic angiosperm fossils are found only from the Early Cretaceous onward. Their center of distribution was somewhere between Eastern India and "Polynesia," perhaps more accurately expressed as "Melanesia." After discussing the differentiation of floras, he deals with the evolution of the Tertiary flora of the Northern Hemisphere. The Appendix explains his ideas regarding the classification of the flowering plants; figure 31, a dendrogram of his 94 accepted, living orders, gives a bird's eye view.

Prof. Takhtajan's "Flowering Plants, Origin and Dispersal" is a quicker book to read and to absorb than is the almost contemporary text book by Prof. Eames. Both books are especially suited for the professional botanist and for the more advanced college student.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XIII

Harold N. Moldenke

CALLICARPA LONGIFOLIA Lam.

Additional & emended bibliography: Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall], 1: 409 & 481. 1820; E. D. Merr., Philip. Journ. Sci. 30: 426. 1926; Moldenke, Phytologia 20: 490 (1971) and 21: 42, 45, & 48--55. 1971.

Additional illustrations: Rumph., Herb. Amb. 4: pl. 59. 1743.

Maheshwari (1963) says that this plant is "grown as a hedge plant in gardens" at Delhi. The corollas are described as "purple" on Bunnak 280, Chien 6024, Cuadra A.1007, Evangelista 923, and R. Ferreyra 8911, "pinkish-purple" on Suvarnakoses 841, "rose-purple" on Chand 7677, "purplish-red" on Steward & Chao 451, "rose-purple to lavender" on Chand 6274, "red" on Lau 177, "pink" on Gressitt 964, "pinkish" on Larsen, Santisuk, & Warncke 3410, "violet" on K. Larsen 10267, "pale-violet" on Villamil 144, "lavender" on M. K. Clemens 10125 and F. A. McClure 3195, "bluish-white" on Fryar 3984, "pinkish-white" on Boonchuai 1125, "white to pale-pink" on Hoogland 5006, and "white" on Brass 3969, 27278, & 29348, Lam 2049, Royen 3004, and Thomsen 664. Liang 66029 represents a very narrow-leaved form.

Sprengel, in his 1825 work, regards C. lanceolaria Roxb. as a distinct species and places C. japonica Thunb. in the synonymy of C. longifolia, but in his 1828 work correctly regards Thunberg's plant as a distinct and valid species. Beissner, Schelle, & Zabel (1903), on the other hand, place C. longifolia in synonymy under C. japonica! Schauer (1847) reduced C. japonica to synonymy under C. longifolia. Li (1963) gives a "C. pilocalyx Clark" as a synonym of C. longifolia, but by this he unquestionably means C. psilocalyx C. B. Clarke, which is a distinct and valid species. The Callicarpa acuminata Roxb. cited as a synonym of C. longifolia by Schauer (1847) is actually C. nudiflora Hook. & Arn., while the C. adenantha R. Br., also cited by him, is C. candicans (Burm. f.) Hochr.

Kanehira & Hatusima (1942) feel that C. formosana Rolfe "does not seem to be distinct from this polymorphous and widely distributed species [C. longifolia]", but with this concept I cannot agree. Dop (1932) regards C. dentata Wall. and C. virens Reinw., each only "in part", as synonyms of C. longifolia. Bean (1951) regards C. longifolia as a synonym of C. japonica var. angustata Rehd., but it is only in "sensu Hemsl." that this is true. The Callicarpus oblongifolia β acuminatissima Hassk. is C. pedunculata R. Br.

Li (1963) reduces C. kotoensis Hayata and C. japonica var. kotoensis (Hayata) Masamune to synonymy under C. longifolia, saying "Hayata says of his C. kotoensis as 'near C. pilocalyx Clark and C. longifolia Lamk., but differs from both by the larger flowers and less hairy leaves' When compared with large series of C. longifolia specimens from all over tropical Asia, the Lanyu plant cannot be specifically separated". I regard both names as synonymous with C. japonica var. luxurians Rehd. Kanehira (1936) regards C. antaensis Hayata as a synonym of what he calls C. kotoensis.

The C. albida Blume, C. attenuata Wall., C. lanceolaria Roxb., C. longifolia Auct., C. longifolia L., C. longifolia Roxb., C. longifolia var. lanceolaria C. B. Clarke, C. longifolia var. lanceolaria (Roxb.) C. B. Clarke, C. oblongifolia Hassk., C. roxburghiana Roem. & Schult., C. roxburghiana Schult., and Callicarpus oblongifolia Hassk., included in the synonymy of the typical form of C. longifolia Lam. by various previous authors (including myself), are now regarded by me as representing f. floccosa Schau., which see.

It should be noted here that the C. americana accredited to Blanco and referred to in the synonymy of C. longifolia is actually a synonym of C. formosana Rolfe, that accredited to Lamarck, to Roxburgh, and to Willdenow belongs in the synonymy of C. americana L. (a valid species), that ascribed to Loureiro is C. candicans (Burm. f.) Hochr., that ascribed to Sessé & Mociffo is C. pringlei Briq., and that ascribed to Thunberg is C. japonica Thunb.; the C. cana accredited to Dalzell & Gibson is actually C. tomentosa (L.) Murr., that credited to Gamble is C. macrophylla Vahl, that of Linnaeus, of Sprengel, and of Vahl is C. candicans (Burm. f.) Hochr., and that ascribed to Wallich is in part C. longifolia and in part C. pedunculata R. Br.; the C. cuspidata of Roxburgh is C. pedunculata R. Br., while that ascribed to Bakhui-zen van den Brink is in part C. longipes Dunn and in part C. rubella Lindl.; the C. dentata credited to Pavon and the Sessé & Mociffo is Cornutia grandifolia (Schlecht. & Cham.) Schau., that of Roth is C. pedunculata R. Br., and that of Roxburgh is C. candicans (Burm. f.) Hochr.; the C. japonica ascribed to the younger Linnaeus is C. japonica Thunb., that ascribed to Matsumura and to Miquel is C. japonica var. luxurians Rehd., that credited to "Hort. ex Pritzel" is C. rubella Lindl., while that ascribed to "Hort. ex Moldenke" is in part C. japonica and in part C. rubella; the C. longifolia accredited to Bentham, to Hance, and to "sensu Mori" is really C. longissima (Hemsl.) Merr., that ascribed to Diels is C. bodinieri var. giraldii (Hesse) Rehd., that ascribed to Hooker is C. brevipes (Benth.) Hance, that credited to "sensu Hemsley" is C.

japonica var. angustata Rehd. and "sensu Li" is C. japonica var. luxurians Rehd., that ascribed to "Auct.", to Linnaeus, and to Roxburgh is C. longifolia f. floccosa Schau., while that credited to Hemsley is in part C. bodinieri var. giraldii and in part C. japonica var. angustata.

Similarly, the C. purpurea ascribed to "Hort. ex Moldenke" and to Van Houtte is a synonym of C. rubella Lindl., that of A. L. Jussieu is C. dichotoma (Lour.) K. Koch, and that of Nakai is C. japonica Thunb., and the C. tomentosa credited to Hooker & Arnott, to Willdenow, and to "sensu Matsumura" is C. kochiana Mak., that ascribed to König is C. macrophylla Vahl, that accredited to Lamark and to Linnaeus "ex Sprengel" is C. candicans (Burm. f.) Hochr., that ascribed simply to Linnaeus is C. erioclona Schau., that ascribed to Linnaeus "ex Willdenow", to Murray, and to "(L.) Santapau" is C. tomentosa (L.) Murr. [a valid species], that of Vahl is as yet unidentified, while that credited to Bakhuizen van den Brink is in part C. arborea Roxb. and in part C. integerrima Champ.

Vernacular names recorded for C. longifolia are "antao-murasaki", "avóravi", "bagiha", "bēbēti kinana", "bēbētik kinana", "bēning-bēning", "callicarpa à longues feuil", "chapal", "chapal kechil", "chukin", "dama bēsoi", "gambiran", "kajoe modang attarasa", "kajoe séran", "kapiériet", "karat bēsi", "katoempang", "katoempang bener", "katumpang", "keling-kahan", "kēméniran", "khow tok", "khu-kwai-lek", "kikatumpang", "ki toempang", "koamoora", "lang-blättrige Schönbeere", "lo kop ngan", "longleaf beautyberry", "long-leaved callicarpa", "méniran oetan", "méniran sapi", "moeniran", "nagaba-murasaki", "nasi-nasi", "papalain", "phlu yaun bai lek", "sekudara", "setampo", "simadgimbadjon", "si se", "songka", "songka kampong", "sulap", "tama", "tampah bēsi", "tampal bēsi", "tampang bēsi", "tampang bēsi puteh", "tampoh bēsi", "tampoh besih", "tampung bēsi", "tapah bēsi", "tibabási", "tígau", "tobaybási", "tulang besi", and "white-fruited tampang besi". The names "méniran oetan" and "tampal bēsi" are applied also to C. candicans (Burm. f.) Hochr.

It is worth noting here that Lamarck's original description of C. longifolia (1785) is often incorrectly dated "1783".

Because of the great importance of Schauer's treatment of this taxon and the various interpretations which have been accorded it since that time, it is worthwhile to repeat his discussion here: "C. longifolia (Lam. dict. 1 p. 562), undique glanduloso-punctata ceterumque vero pube stellatâ magis minusve farinoso-tomentosa aut subglabrata, foliis membranaceis lanceolato-oblongis lanceolatae utrinque attenuatis brevipetiolatis longe acuminatis serrato-denticulatis, cymis multifloris divaricato-dichotomis confertiusculis convexis pedunculo petiolum subaequante folio multoties brevioribus, calyce brevi 4-costato ore truncato brevissime 4-mucronulato. } In Indiâ orientali usque in Japoniam. Folia 6 poll. circ. longa, 2 poll. lata, penninervia, venosa,

plana, supra viridia vix nitidula, subtus pallidiora, utrinque subtus vero magis punctis resinosis flavis dense consita. Calyx semilineam longus. Cor. calyce jam duplo jam vero non nisi dimidio longior. Stam. exserta, antherarum connectivo et sulco faciali dense glanduloso-punctatis (v. s. in h. DC., Nees, Lucae aliorq.)

"*C. subglabrata*, ramulis cum inflorescentiae ramulis foliorumque reti utrinque pube stellatâ farinosis interdum subglabratis calyce foliorumque adutorum paginis glabris. -- In Indiâ orient. e. gr. prov. Silhet (Wall.! cat. no. 1829), in Javâ (Bl.! Jungh.! Zolling.! pl. jav. no. 156! et 223!), in Philippinis (Cuming.! n. 1330), in Japoniâ (Zolling.! pl. jap. n. 349). *C. longifolia* Lam. l. c. et ill. t. 69 f. 2, Bot. reg. t. 864! Hook. exot. fl. 1 p. 133! *C. Japonica* Thunb. fl. jap. p. 60. *C. lanceolaria* Roxb.! fl. ind. 1 p. 395."

Miquel's original description of his *C. lanata* β *uberior* (1856) is "foliis e basi cuneata elliptico-oblongis, acumine haud abrupte terminatis, semi pedalis.....Sumatra."

Merrill (1912) comments that the Cuming 1330 collection from the Philippines, cited by Schauer in the above quotation, certainly does not agree well with the original description of *C. longifolia* and "to me does not appear to be closely allied to Lamarck's species". He therefore makes it the type collection of *C. dolichophylla* Merr., and with this disposition I fully agree.

When Schauer's two named forms were regarded as separate from the typical form of the species, the following key was proposed and used in the annotation of a considerable number of herbarium specimens in many widespread herbaria:

1. Leaf-blades glabrous beneath or practically so, no stellate hairs on the lamina of the lower surface; hairs, if present, simple, or stellate only on the midrib.....*C. longifolia*.
- 1a. Leaf-blades more or less stellate-floccose beneath.
 2. Leaf-blades very sparsely stellate on the lower surface, chiefly on the midrib and larger venation.....*C. longifolia* f. *subglabrata*.
 - 2a. Leaf-blades more densely stellate on the lower surface, on the lamina as well as on the venation.....*C. longifolia* f. *floccosa*.

This separation, however, has not proved to be practical and I now regard Schauer's f. *subglabrata* to be equivalent to the typical form of the species, as, indeed, it was originally proposed by him. His f. *floccosa*, then, is the only one of his two forms now accepted as worthy of being maintained. It was Hochreutiner (1934) who first pointed out that Schauer's form "*subglabrata*" was actually "*Varietas typica speciei*" and not a separate taxon.

The Hainan material cited below has, in general, the leaf-blades completely glabrous. Other material is merely subglabrous on the lower surface, with no stellate hairs on the actual lamina, the hairs (when present) being mostly simple, or the

stellate hairs are confined to the midrib.

Callicarpa longifolia is employed as a hedge plant in parts of India, and is also used as a fish-poison. Its bark is used by the Japanese on the Johnstone River, in Queensland, as a substitute for the betel leaf when chewing the Areca nuts with lime. Lam (1924) reports that it is also used to check dysmenorrhea. Heyne (1917) has this to say: "Rumphius geeft den naam sanka....opvoor zijn Mamanira alba....., welke nog niet met zekerheid is geïdentificeerd en beschrijft dien als een struik, niet boven een man hoog, wassende op magere velden, in het kreupelbosch en in verlaten tuinen. Van de wortels koken sommigen een drank tegen buikloop. De bladeren dienen als kraamzuiverend middel en, fijngevreven met rijst en wat djinten in azijn gekookt, ter bevochtiging van onslagen voor - of tot het verdrijven van - harde gewellen. Het gebruik van de bladeren van C. longifolia, dat mij te Buitenzorg werd opgegeven, komt hiermede overeen: zij zouden m. l. de medicijn wezen voor wonden en zwellingen, die maar niet beter willen worden. Ook de toepassing door Ridley....vermeld, dat de bladeren worden gebizigt tegen koliek, vindt men bij Rumphius terug in het gebruik van de wortels.

"Nog twee mijner aantekeningen maken melding van inwendig gebruik als geneesmiddel (een van een afkooksel en een van een koud aftreksel van de gevreven bladeren), zoodat het verwondering baart, dat deze plant zoo giftig is voor visschen als volgen moet uit Indische Vergiftrapporten No. 201, indien tenminste de opgegeven wetenschappelijke naam juist is. Men leest daar, dat op Siao de bladeren van den tama worden gebizigt om de visschen te doden, die bij eb in het rif zijn achtergebleven. Daartoe worden de bladeren of fijngestampt in het water geworpen, of aan de steenen van het rif gekneusd, zoodat het sap zich met het zeewater vermengt. De visschen zouden onmiddellijk bedwelmd geraken en zich gemakkelijk laten vangen. Hetzelfde geval doet zich echter voor bij een andere (nog niey herkende) Callicarpasoort, door Rumphius (IV, bl. 124) onder den naam van Frutex ceramicus beschreven als een heester, op Ambon onbekend, doch op Banda als kajoë ceram in de hoven geplant als vischbedwelmd middel. Hij zegt, dat men de bladeren stampet in een korfje doet en afgedekt een nacht laat staan. Men gaat daarmede naar plaats, waar bij aflopend getij water is blijven staan en strooit het, al wrijvend totdat het schuimt, op het water; de visschen komen daardoor dood boven drijven. Voor de menschen en overige wezens is echter, zegt Rumphius, deze plant onschadelijk, want de wortel wordt als medicijn inwendig gebruikt, de bladeren worden door bokken en schapen afgegraasd en spreeuwen en andere vogels eten de vruchten!"

Pammel, on the authority of Greshoff, also records this species as a fish-poison. Uphof (1968) says that it is "Used for poulticing in fever and colic among the Malays".

It should be noted here that the type collection of C. javanica is Zippelius s.n. from Java and that of C. attenuifolia is Elmer 13536 from Mindanao, Philippine Islands. The Wallich 1835.1, ci-

ted below, and collected in 1822 on Penang Island, is a cotype of C. attenuata Wall., the other cotypes being an Ahern and a Jack collection not seen by me. The basis of C. tomentosa Thunb. is the Thunberg s.n. specimen cited below and deposited in the herbarium of the Naturhistoriska Riksmuseum in Stockholm, while that of C. longifolia var. acuminatissima is Ploem s.n. from Java deposited in the Buitenzorg herbarium.

Kuntze (1891) says of his C. longifolia var. pubinervis: "Folia subtus in nervis pubescentia ceterum glabra, sed glandulis punctiformibus munita. Java, verbreitet. Der Beschreibung nach gehört auch var. lanceolaria Clarke hierher, aber lanceolaria Roxb. wird leaves very hoary underneath beschrieben. Unter var. subglabrata verstand Schauer noch var. japonica OK. (Thbg. 1784), foliis glaberrimis." I am designating Kuntze 5166 in the Britton Herbarium at the New York Botanical Garden as lectotype of this variety because this is the only one of the five specimens in Kuntze's herbarium labeled as this variety by him which has the Latin description placed by him after the name; it was collected at Ngalingung, Java, at an altitude of 3000 feet, on June 23, 1875.

Lindley & Paxton (1853) also comment on the error made by Schauer (1847) in uniting C. japonica Thunb. with C. longifolia, and point out some of the obvious differences between the two taxa, stating that in C. longifolia the cymes are smaller, the calyx is firm and fleshy, and the calyx-teeth more conspicuous, and that it is "a southern plant, much more tender" than C. japonica.

Chopra, Badhwar, & Ghosh (1965) report C. longifolia from the Nicobar Islands. They claim that var. lanceolaria (Roxb.) C. B. Clarke differs only in having the leaves narrower and thinner, "glabrate and densely minutely gland-dotted beneath when mature!" This, however, is a misinterpretation of that taxon, for, as Kuntze pointed out, Roxburgh's original description calls for the leaf-blades to be "very hoary underneath". In my opinion, it belongs in the synonymy of f. floccosa Schau. The "var. lanceolaria" in the interpretation of Chopra, Badhwar, & Ghosh is said by them to occur plentifully in central Bengal and in the Khasi Hills up to an altitude of about 3000 feet and that "it likely possesses fish-poison properties". These same authors describe the mature leaves of C. longifolia as "beneath so closely fulvous stellate-villous that few of the glands are visible", but obviously this applies not to the typical form of the species but to f. floccosa only. It would seem, therefore, that what they regard as typical C. longifolia is really f. floccosa, while what they regard as var. lanceolaria is actually the typical C. longifolia. They refer to the fruit as a "berry", but it is actually a drupe.

Maheshwari (1963) reports that at Delhi the species blooms

from September to November and fruits from January to March. He cites Maheshwari 663, taken from cultivated material growing in the Talkatora Gardens of Delhi.

Bakhuizen van den Brink (1921) describes C. longifolia as "A slender shrub, branchlets, cymes and petioles almost glabrescent; leaves lanceolate, minutely denticulate-serrulate to almost entire, upper side glabrous when adult, lower side almost glabrous, except on the nerves; cymes slender, lax, rather long petioled; calyx scarcely hairy or glabrous; corolla rose or whitish, scarcely pubescent outside; ovary densely glandular, not hairy." He comments about the f. subglabrata and f. floccosa: "It is not possible to distinguish distinctly the numerous varieties, which exist between the above-mentioned two extreme forms."

Domin (1928) describes, but does not name, a "forma inflorescentia valde laxa, divaricata, iteratim dichotoma excellens" from Queensland, based on his unnumbered collection from "bei Yarraba in den die Bachufer begleitenden Regenwälder bis 550 m emporsteigend", collected in January, 1910. A note by C. T. White on Brass 3969 from Papua says "almost the same as much Queensland material under C. longifolia". Koorders (1912) tells us that C. longifolia is found over "Ganz Java: Von 0--1700 m. ü. M. im lichten Regenwald gemein aber zerstreut".

Junell (1934) notes that "Auch bei C. longifolia habe ich einigemale beobachtet, dass die Teilung des Zentralkerns von Bildung einer Querwand begleitet ist". Dop (1932), in speaking of C. bracteata Dop, says: "Cette espèce est voisine du C. longifolia Lam. Elle s'en distingue aisément par les pédoncules des cymes beaucoup plus longs, les bractées foliacées. La longueur du pédoncules la rapprocherait du C. longipes Dunn de Chine et de Hongkong; mais les feuilles longuement atténuées, la calice à dents très petites, l'éloignent nettement du C. longipes à feuilles arrondies ou cordées à la base et à calice divisé jusqu'au milieu."

A wood sample accompanies R. S. Williams 2116. The Teijsmann s.n. [Boeroe Kajeli] specimen, cited below, is interesting because it consists only of complete leaf-skeletons! The R. Freyreya 4076 collection from Lima, Peru, is doubtfully placed here since the collector avers that its fruits were red and that it grew in a stony habitat, with no hint that it represents cultivated material.

Vidal y Soler (1885) cites Cuming 1330 from the Philippine Islands, but this number is the type collection of C. dolichophylla Merr., as has been pointed out previously.

Domin (1928) cites Domin s.n. [Harvey's Creek, XII.1909] & s. n. [Yarraba, I.1910] from Queensland. Bentham & Mueller (1870) cite only a Dallachy s.n. [Rockingham Bay] from Queensland. Apparently this was the only Australian specimen of this species known to them. They describe it as "leaves....green and nearly glabrous or sprinkled with very short hairs above, more copiously

tomentose and glandular underneath but usually green or very slightly rusty or whitish." This description definitely points to f. floccosa Schau. rather than to the typical form of the species.

Koorders (1912) cites Pulle 3119 from Java. Bakhuizen van den Brink (1924) cites Atasrip 44, Lam 2049, and Thomsen 664 from New Guinea. Lam (1914) cites Elbert 3000 & 3064 from Celebes, Elbert 1864 from Lombok, and Grundler 4183 & 4199 from Sumbawa, while in his 1924 work he cites Ledermann 6597, 6836, 9226, & 11547a and Schlechter 14303 from Northeastern New Guinea and Kraemer s.n. [1909] from New Ireland. King & Gamble (1908) cite the following material from Malaya: Johore: G. King s.n. Langkawi Island: Curtis 2134. Malacca: Griffith 6039, Maingay 1191. Penang: King & Stoliczka s.n., Wallich 1835. Perak: King's Collector [Kunstler] 80 & 239, Stortechini 1214. Selangor: Curtis s.n. Singapore: Cantley 120, Hullett s.n., Lobb s.n., Schomburgk 54, G. Thomson 44, Walker 207. Cultivated, Singapore: Deschamps s.n.

Chang (1951) cites C. I. Lei 114, McClure 8036, and nos. 25599, 35399, 35683, 43543, 60928, 61204, 61314, 61385, 64465, 66542, & 72820 of collectors and/or herbaria whose names he gives only in Chinese characters.

Material of C. longifolia has been misidentified and distributed in herbaria as C. acuminata H.B.K., C. angusta Schau., C. cana L., C. caudata Maxim., C. dichotoma (Lour.) K. Koch, C. longifolia var. floccosa Schau., C. macrophylla Vahl, C. pedunculata R. Br., and C. psilocalyx C. B. Clarke.

On the other hand, the Ahern's Collector s.n. [Herb. Philip. Forest Bur. 1888], distributed as C. longifolia, is actually C. angusta Schau.; Teijsmann 3525 H.B. is C. arborea Roxb.; Bulock s.n. is C. bodinieri Lévl.; Giraldi s.n. [Monte Kin-qua-san, 10. VII.1897] and Henry 7312 are C. bodinieri var. giraldii (Hesse) Rehd., the former probably being the type collection; Liang 62267 and C. Wright s.n. [Hong Kong] are C. brevipes (Benth.) Hance; Sindhipongse 76 [Herb. Roy. Forest Dept. 6020] is C. candicans var. sumatrana (Miq.) Moldenke; Mearns & Hutchinson 4755 is C. caudata Maxim.; Cuming 1330 is the type collection of C. dolichophylla Merr.; Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 28513] is C. formosana var. glabrescens Moldenke; H. H. Bartlett 6936 & 8603, Bartlett & La Rue 419, Boeea 6508, 9049, 9396, & 9549, Clemens & Clemens 3029 & 3481, Mrs. D. J. Collins 2365, Gebruik 81, Hamel & Toroës 1165, M. R. Henderson 19633 & 20491, Herb. Hort. Bot. Bogor. XV.KA.45.3, Loeb 91, F. A. McClure 3195 [Herb. Canton Chr. Coll. 9743], Native Collector 273, Nur 18835 & 32651, G. E. Perry 5228, Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 44064 & 44326], Saimoendt 20, U. Singh 81, Toroës 164 & 3002, D.

D. Wood 785, and H. S. Yates 653, 1486, & 1604 are all C. longifolia f. floccosa Schau.; Liou 884 is C. longipes Dunn; R. C. Ching 7738, H. H. Chung 2477, and Nevin s.n. [China] are C. longissima (Hemsl.) Merr.; La Rue s.n. [Citrus Exp. Sta., Riverside] is C. macrophylla Vahl; W. W. Clark s.n. [Herb. Philip. Forest Bur. 2534] and Mearns & Hutchinson s.n. [May 1906] are C. merrillii Moldenke; Wilkes s.n. [Sulu Archipelago] is C. nigrescens Merr.; A. Forbes 21 and Hort. Huber 725 are C. pedunculata R. Br.; W. Kaudern 313 is C. pilosissima Maxim.; Schlagintweit 483 is C. rubella Lindl.; and D. D. Wood 1227 is C. superposita Merr.

The Hamel & Toroes 1165, Hollrung 817, Hoogland 3653, Native Collector 273, and D. D. Wood 785, cited below, are placed here tentatively. Some specimens of these collections are also cited under C. longifolia f. floccosa. These specimens were mostly annotated by me a considerable number of years ago, before my present concepts of the delimitations of these taxa had crystallized. The specimens need to be re-examined.

The Clemens & Clemens 3029 & 21090, Krukoff 4035, Mondi 23, G. E. Perry 5228, Toroes 164, C. Wang 35683, and R. S. Williams 2116 previously regarded by me as representing typical C. longifolia, and so annotated by me in some herbaria, seem actually to represent f. floccosa instead.

The Elmer 20102 & 20402 collections, cited below, actually show some of the lower leaf-surfaces more or less sparsely stellate, but this is usually only on the youngest leaves; the adult leaves are glabrate beneath, so I am retaining these two collections here under the typical form of the species. The Elmer 15336 and Lei 1114 also seem to exhibit intermediate characters.

In all, 384 herbarium specimens, including type material of several of the names involved, and 5 mounted photographs have been examined by me.

Additional citations: PERU: Lima: R. Ferreyra 4076. MADAGASCAR: Bélanger s.n. (P). PAKISTAN: East Bengal: King's Collector 16 (W--369327), 173 (Bz--18039). INDIA: Assam: Belcher & Juan 54 (W--2212892); Chand 2198 (Mi), 2489 (Mi), 6274 (Mi), 6334a (Mi), 7677 (Mi); Jenkins s.n. (Bz--18036); Koelz 24215 (Mi), 27375 (Mi), 27378 (Ca--1343036, Mi); Prazer s.n. [1890] (Bz--18035). Delhi: Herb. Delhi Univ. 270 (Gg--413464). Khasi States: C. B. Clarke 14944 [599] (W--802505), 14948 [599] (W--802505), 17824C [600] (W--802663); Hooker & Thomson s.n. [Mont. Khasia] (N, S). Uttar Pradesh: Mani s.n. [15-10-49] (N); U. Singh 81 (Bz--18045, La, N). State undetermined: Thunberg s.n. (S, S); Wallich s.n. [Ind. or.] (T). BURMA: Tenasserim: Falconer 504 (Bz--18040, Bz--18042); Helfer 6038 (S, T). State undetermined: Meebold 14076 (S), 17002 (S). ANDAMAN ISLANDS: South Andaman: Heinig s.n. [1898] (Bz--18041); Prain's Collector 27 (Na--19553). MERGUI ARCHIPELAGO: J. Anderson

s.n. [Mergui Archipelago, 1882] (W--261237). CHINA: Kwangsi: Ching 6394 (Ca--409949); Steward & Cheo 451 (S); Tsang 24001 (N). Kwangtung: F. A. McClure 3195 [Herb. Canton Chr. Coll. 9743] (Ph). Szechuan: Chien 6024 (Ca--1322552). CHINESE COASTAL ISLANDS: Hainan: Gressitt 964 (I); Herb. Canton Chr. Coll. 8036 (Gg--127985); F. C. How 72465 (Bz--18044); Lau 177 (B, Ca--525134, Mi, N, W--1629244); Lei 114, in part (B, Ba, Ca--612175, N); Liang 62267 (N), 66029 (Go, N); F. A. McClure s.n. [Herb. Canton Chr. Coll. 8036] (Bi, Ca--366338); Tak 100 [Herb. Lingnan Univ. 15599] (Ca--315700); C. Wang 32940 (N), 33354 (N), 34161 (N), 35999 (N), 36332 (N). THAILAND: Boonchui 1125 [Herb. Roy. Forest Dept. 26399] (S); Bunnak 280 [Herb. Roy. Forest Dept. 9649] (Ss); Mrs. D. J. Collins 1667 (W--1701359); Kasin 395 (Bz--72835); K. Larsen 10267 (Lw); Larsen, Santisuk, & Warncke 3410 (Ac); Smitinand 1387 [Herb. Roy. Forest Dept. 7307] (Z); Suvarnakoses 841 [Herb. Roy. Forest Dept. 12939] (Sm); Thaworn 423 [Herb. Roy. Forest Dept. 14548] (Gg). INDOCHINA: Cambodia: Thorel s.n. [Paklai, Mekong] (Ca--38110). Tonkin: Balansa 3808 (W--2496752); Pételot 8700 (N); Rothé 25 (B). State undetermined: G. W. Groff 5783 (Ca--300192, Gg--31991); Pételot 1086 [Phy Ho] (Ca--227713). MALAYA: Penang: Wallich 1835.1 (M). Singapore: N. J. Andersson s.n. [28 Jan. 1853] (S); Herb. Schles. Bot. Tauschver. 25 (B). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Batan: H. H. Bartlett 15449 (Mi), 15502 (Mi). Cebu: M. Ramos s.n. [Herb. Philip. Bur. Sci. 11078] (Cm). Luzon: Ramos & Edaffo s.n. [Herb. Philip. Bur. Sci. 28513] (W--1294195); Rivera & Duyag s.n. [Herb. Philip. Bur. Sci. 75008] (Ca--359450); Wöhler 76 (S). Mindanao: Elmer 13536, in part (Bi, N, Ut--33518). Negros: Elmer 10375 (Vt). Tawitawi: S. Olsen 833 (Cp). INDONESIA: GREATER SUNDA ISLANDS: Borneo: Amdjah 253 (Bz--17697), 553 (Bz--17685, Bz--17686), 619 (Bz--17687), 639 (Bz--17688); Boden Kloss 19112 (Bz--17691, Ca--346154); Buwalda 7895 (Bz--72860); Enderit 1461 (Bz--72570), 1751 (Bz--72713), 5261 (Bz--72709); Haviland & Hose 5620 (V--405); Jaheri 1893 (Bz--17693, Bz--17694, Bz--17695); Rutten 571 (Ut--40834), 617 (Ut--41059); Soloh & Main 21812 (Bz--72985). Celebes: Bloembergen 4093 (Bz--18061), 4228 (Bz--18702), 4259 (Bz--18062); Kjellberg 397 (S), 725 (S); Rachmat 588 (Bz--17946). Java: Altmann 415 (Bz--17719); Arain 19508 (Bz--17835), 19663 (Bz--17833, Bz--17834); Backer 173 (Bz--17840, Bz--17841), 572 (Bz--17721), 1058 (Bz--17806, Bz--17807), 2036 (Bz--17721, Bz--17722, Bz--25471), 7264 (Bz--17823), 9939 (Bz--17821, Bz--17822), 12317 (Bz--17771, Bz--17772), 12836 (Bz--17812, Bz--17813, Bz--17814), 14414 (Bz--17810, Bz--17811), 14986 (Bz--17720), 16201 (Bz--17838, Bz--

17839), 17261 (Bz--17815, Bz--17816, Bz--17817), 18810 (Bz--17843), 23387 (Bz--17809), 24016 (Bz--17824), 32673 (Bz--17724, Bz--17725), 32677 (Bz--17774), 32684 (Bz--17735, Bz--17736, Bz--17737), 32685 (Bz--17733, Bz--17734); Backer, Overeem, & Slooten 35169 (Bz--17744); Bakhuizen van den Brink 284 (Bz--17789), 1157 (Bz--18049), 2157 (Ut--24880a), 2643 (Bz--17776), 3170 (Bz--17732); Berger 548 (Bz--17728), s.n. [5-6-17] (Bz--17782); Beumée 726 (Bz--17858), 1897 (Bz--17845), 1946 (Bz--17857), 3606 (Bz--17846), 5297 (Bz--17847); Bruggeman 669 (Bz--17729); Burck & Monchy s.n. [Depot] (Bz--17780, Bz--17781); Buwalda 2761 (Bz--73012); E. Christophersen 53 (Bi); Collector undesignated 109 (Bz--17751, Bz--17752), s.n. (Bz--17848); Danser 6789 (Bz--17726); Docters van Leeuwen-Reijnvaan 730 (Bz--17849), s.n. [21 Januari 1911] (Bz--17739); Edeling s.n. (Bz--17836); Forbes 748 (Bz--17869, Bz--17870); Franck 1019 (W--2126077); H. Hallier 115 (Bz--17820), 115a (Bz--17818, Bz--17819, Ca--265965), 477 (Bz--17749, Bz--17750), s.n. [24.VIII.1896] (Bz--17745, Bz--17746, Ut--53165); Hochreutiner 723 (Ca--41175); Koorders 9705b [361*] (Bz--17887), 11075 [55*] (Bz--17906), 12154b (Bz--17897), 14926b [129*] (Bz--17896), 15241b [178*] (Bz--17894, Bz--17895), 20653b [1061*] (Bz--17886), 26277b [310*] (Bz--17898), 27104b [241*] (Bz--17903, Bz--25475), 30033b [1749*] (Bz--17882, Bz--17883), 30239b (Bz--17884, Bz--17885), 33957b [76*] (Bz--17905), 34041b [270*] (Bz--17904), 34351n [3875*] (Bz--17893), 44477 [452*] (Bz--18055); Kramer 333 (Bz--17853); Kuntze 4554 (N), 4763 (N), 5166 (N), 5971 (N, N); Monchy 11 (Bz--17829), 56 (Bz--17828); Ploem s.n. (Bz--17830, Bz--17831); Pulle 3119 (Ut--2429, Ut--2430); Rant 78 (Ut--30080); Sapiin s.n. [Poentjak] (Bz--17837); Scheffer s.n. [Batavia, 5 Oct. 1870] (Bz--17800), s.n. [Buitenzorg] (Bz--17798, Bz--17799), s.n. [Preanger] (Bz--17784, Bz--17786), s.n. [Tjibodas] (Bz--17805); Soegandiredjo 60 (Bz--17794, Bz--17795), 78 (Bz--17755), 194 (Bz--17754), 200 (Bz--17753), 256 (Bz--17756); Teijsmann 1338 H.B. (Bz--18031); Ultée 8 (Bz--17876), 35 (Bz--17731); Van Steenis 1855 (Bz--18064), 1926 (Bz--18063), 6943 (Bz--17718); Yates 3025 (Ca--343878, La, N); Zippelius 43 (Bz--17865), s.n. [Java] (Ca--918486); Zollinger 223 (S), 3181 (S). Kangean: Backer 27436 (Bz--17907, Bz--17908), 27925 (Bz--17909, Bz--17910, Bz--17911); Beguín "U" (Bz--17913, Bz--17914, Bz--17915, Bz--17916); Dommers 86 (Bz--17912). Karimandjaroa: Karta 392 (Bz--17918). Madura: Backer 19939 (Bz--17919). Riouw: Bünnemeijer 5824 (Bz--18018). Sabah: M. K. Clemens 10125 (Ph); Cuadra A.1007 (W--2210834); Elmer 20102 (Bi, Br, Bz--17689, Ca--22900, Du--168073, I, Ka--67224, N, S, Um--90, Ut--82684), 20402

(Bi, Br, Bz--17705, Ca--312126, Du--165464, N, S, Ut--84755); B. Evangelista 923 (N); Villamil 144 (Ph); D. D. Wood 855 [field no. 160] (Ph), 2529 (Ca--320252). Sarawak: Clemens & Clemens 21090 [field no. 5143] (Bz--17702, Bz--17703, N); Native collector 273 (Bz--17692), 1672 (Ca--214279), 1884 (Bz--17690), s.n. [Mt. Poi, 30.10.27] (Ca--357244). Singkep: Bünnemeijer 7230 (Bz--18013). Sumatra: Boeea 10109 (Ca--190626, N); Bünnemeijer 8063 (Bz--17976, Bz--58351); Buwalda 6661 (Bz--72568); Collector undesignated s.n. (Bz--17979); Diepenhorst 1338 H.B. (Ut--53395); Gusdorf 251 (Bz--17990); Hamel & Toroes 1165 (Bi); Iboet 150 (Bz--17964); Lütjeharms 3841 (Bz--18009), 4262 (Bz--18009); Voogd 187 (Bz--17975); Yates 1066 (Bz--17963). LESSER SUNDA ISLANDS: Bali: Sarip 40 (Bz--17920, Bz--17921). Sumbawa: Rensch 563 (Bz--17922). MOLUCCA ISLANDS: Buru: Teijsmann s.n. [Boeroe Kajeli] (Bz--17933). Timor Laoet: Buwalda 4316 (Bz--72566). MELANESIA: NEW GUINEA: Dutch New Guinea: Kanehira & Hatusima 11456 (Bz--18057); Royen 3004 (Ng--20213). Fergusson Island: Brass 27278 (N). Northeastern New Guinea: Floyd 7288 (Ng--16894); Fryar 3984 (Bi, Bz--72701, Ng--16852, Ng--16870); Hollrung 817 (Mb); Hoogland 5006 (Ng--8323); F. R. R. Schlechter 16453 (S). Papua: Brass 3969 (Bz--15058, N, W--1942992), 29348 (N, W--2390939). Province undetermined: Clemens & Clemens 1416 (Br, Br). BISMARK ARCHIPELAGO: Mussau: Köie & Olsen 1670 (Cp). New Hanover: Dissing, Köie, & Olsen 1908 (Ac, Cp). AUSTRALIAN REGION: AUSTRALIA: Queensland: C. T. White 8979 (N, N, N). CULTIVATED: Australia: Camfield s.n. [Port Jackson District, 11.1896] (Po--64816). Belgium: Herb. Hort. Thenensis II.691 (Br), II.805 (Br). California: Walther s.n. [Howard & Smith's Nursery, July 1921] (Gg--31992). France: Herb. Hort. Huber 798 (Io--30258). India: Herb. Hort. Bot. Calcutt. s.n. (Br, Bz--18034, Bz--18038, Ed, Ed, Mu--942, Mu--967, Mu--1160, N--photo, N--photo, T, X, X, Z--photo, Z--photo); Herb. Liebmann s.n. [h. Calcutt.] (Cp); Wallich 763 (Cp). Java: Bakhuizen van den Brink s.n. [Hort. Bot. Bogor.] (Bz--25479); Brugeman 53 (Bz--18065); Herb. Hort. Bot. Bogor. 164 (W--650966), s.n. (Bz--17713, Bz--18032); Herb. Tjibodas "U" (Bz--17710). Massachusetts: C. K. Schneider s.n. [Chenault 6622] (Ar--19788). New York: Teuscher s.n. [Boyce Thompson Arb.] (N). Peru: R. Ferreyra 8911 (Z). LOCALITY OF COLLECTION UNDETERMINED: Condes 21 (Bz--17851); Jameson s.n. (Ed, Ed); Monchy 11 [Kerawang] (Bz--17829), 56 [Kerawang] (Bz--17828).

CALLICARPA LONGIFOLIA f. *FLOCCOSA* Schau. in A. DC., Prodr. 11: 645, as *C. longifolia* ♂ *floccosa*. 1847; Bakh. in Lam &

Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 26. 1921.

Synonymy: Callicarpa lanceolaria Roxb., Hort. Beng. [10], hyponym. 1814; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409. 1820 [not C. lanceolaria Hort., 1821]. Callicarpa longifolia L. ex Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409, in syn. 1820 [not C. longifolia Benth., 1966, nor Diels, 1916, nor Hance, 1932, nor Hemsl., 1916, nor Hook., 1932, nor Lam., 1785, nor "sensu Hemsl.", 1939, nor "sensu L.", 1966, nor "sensu Mori", 1962]. Callicarpa albida Blume, Bijdr. Fl. Nederl. Ind. 14: 818. 1826. Callicarpa longifolia Roxb. apud J. A. & J. H. Schult., Mant. 3: 53, in syn. 1827. Callicarpa roxburghiana Schult. in J. A. & J. H. Schult., Mant. 3: 54. 1827. Callicarpa attenuata Wall., Numer. List [50], hyponym. 1829. Callicarpus oblongifolia Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844. Callicarpa roxburghiana Roem. & Schult. ex Schau. in A. DC., Prodr. 11: 645, in syn. 1847. Callicarpa oblongifolia Hassk. ex Schau. in A. DC., Prodr. 11: 645, in syn. 1847. Callicarpa longifolia var. lanceolaria (Roxb.) C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 570. 1885. Callicarpa longifolia var. floccosa Schau. ex Kuntze, Rev. Gen. Pl. 2: 503. 1891. Callicarpa longifolia var. lanceolaria C. B. Clarke apud H. J. Lam, Verbenac. Malay. Arch. 87, in syn. 1919; Chopra, Badhwar, & Ghosh, Poison. Pl. India 2: 696, fig. 175. 1965. Callicarpa longifolia Auct. ex Backer & Bakh., Fl. Java 2: 601, in syn. 1965.

Bibliography: Roxb., Hort. Beng. [10]. 1814; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409 & 481. 1820; Blume, Bijdr. Fl. Nederl. Ind. 14: 818. 1826; J. A. & J. H. Schult., Mant. 3: 53--54. 1827; Wall., Numer. List [50]. 1829; Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844; Schau. in A. DC., Prodr. 11: 645. 1847; Benth. & F. Muell., Fl. Austral. 5: 57. 1870; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 570. 1885; Watt, Dict. Econom. Prof. India 2: 27. 1889; Kuntze, Rev. Gen. Pl. 2: 503. 1891; Prain, Bengal Pl., pr. 1, 827. 1903; King & Gamble, Journ. Roy. Asiat. Soc. Bengal 74 (2), extra no., 807--808. 1908; H. J. Lam, Meded. Rijksherb. Leiden 37: 32. 1914; H. J. Lam, Verbenac. Malay. Arch. 71, 87, [361], & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 26--27. 1921; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 90. 1924; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; A. L. & H. N. Moldenke, Pl. Life 2: 79. 1948; H.-T. Chang, Act. Phytotax. Sin. 1: 280, 291, & 311. 1951; Moldenke, Phytologia 4: 121--124. 1952; Moldenke, Inform. Mold. Set 51 Spec. 2. 1956; Moldenke, Résumé 174, 175, 177, 179, 182, 186, 187, 189, 191--194, 196--198, 200, 202, 213, 245, & 444. 1959; Moldenke, Résumé Suppl. 3: 20, 23, & 24. 1962; Chopra, Badhwar, & Ghosh, Poison. Pl. India 2: 696, fig. 175. 1965; Backer & Bakh., Fl. Java 2: 601. 1965; Rao & Rabha, Bull. Bot. Surv. India 8: 301. 1966; Tingle, Check List Hong Kong Pl. 37. 1967; Moldenke, Résumé Suppl. 15: 10--13. 1967; Moldenke, Phytologia 15: 15 (1967) and

16: 371, 373, & 388. 1968; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 199. 1968; Moldenke, Résumé Suppl. 16: 17 & 18. 1968; Stearn, Notes & Rec. Roy. Soc. Lond. 24: 84. 1969; M. A. Rau, Bot. Surv. India 10, Suppl. 2: 61. 1969; Moldenke, Phytologia 21: 48 & 49. 1971.

Illustrations: Chopra, Badhwar, & Ghosh, Poison. Pl. India 2: fig. 175. 1965.

This form differs from the typical form of the species in having the branches and branchlets more or less densely flaccid or canescent-tomentose or canescent-furfuraceous with branched hairs, the petioles densely tomentose or furfuraceous, the leaf-blades more or less densely stellate-furfuraceous or hoary beneath, the peduncles and pedicels densely canescent-furfuraceous or flavescent-tomentose, the bractlets pubescent, the calyx more or less densely pubescent or granulose-puberulent, the ovary densely granular-pulverulent, and the fruiting-calyx varying from densely puberulent to lightly pulverulent.

Schauer's original (1847) description of this taxon is as follows: "*P. floccosa*, ramulis cum inflorescentiae ramis calyce foliorumque reti floccoso-tomentosis, foliis adultis superâ paginâ glabratis inferâ vero floccis stellaribus sparsis nunc rarioribus nunc crebrioribus indutis quin subcinereo-tomentosis. -- In Indiâ orientali, in insulâ Prince of Wales (Roxb. Wall.!), ad Singapoer (Gaud.!), in Javâ (Thunb.! Blume! Jungh.!), in Manillâ (Gaudich.!), in N. Hollandiâ tropicâ (R. Br.). *C. longifolia* Roxb.! flor. ind. 1 p. 394, et *C. acuminata* Roxb. *ibid.* ex descr. *C. Roxburghiana* Roem. et S. syst. mant. p. 54. *C. attenuata* Wall. cat. 1835! *C. adenanthera* R. Br. prodr. fl. nov. holl. 1 p. 369 (ex diagnosi). *C. oblongifolia* Hassk. hort. bogor. p. 136. *C. albida* Blume! bijdr. p. 818 (forma fol. lanceolatis angustioribus). Haec forma, priori continuâ serie varietatum indumenti connexa, ceterum ab illâ nec habitu nec characteribus differt."

The *C. acuminata* Roxb., which Schauer includes in the synonymy of this form, is actually a synonym of *C. nudiflora* Hook. & Arn., while the *C. adenanthera* R. Br., which he also includes here, is a synonym of *C. candicans* (Burm. f.) Hochr. His Australian record must therefore be discounted and the R. Brown collection removed from the list of cotype collections which typify the trinomial.

Recent collectors describe the plant as a bush, subshrub, or small to tall shrub, 1--5 m. tall, or rarely a small tree, 8--15 m. tall, the trunk usually only about 2 cm. in diameter, but sometimes attaining a girth of 12.8 cm., the leaves dark-green above, pale-green beneath, the flowers pubescent, buds green, anthers yellow, and the fruit green when young, white when mature [or "purple" on Wang 3635, probably an error in transcription]. It has been found in forests, dense or open forests, primary or secondary forests, evergreen forests or light woods, forests near boulder creeks, secondgrowth jungles, thickets, open thickets, etc.

CERTAMEN MELASTOMATACEIS XVI.

John J. Wurdack

U. S. National Herbarium, Smithsonian Institution

The current melastome notes are mostly a continuation of information gathered in European herbaria under the auspices of the Smithsonian Research Foundation (Phytologia 20: 369-389. 1970). Loans of critical material from some of the museums visited (BM, BR, C, FI, K, M, OXF, P, W), as well as The New York Botanical Garden and the Instituto Botanico (Caracas, Venezuela), are gratefully acknowledged.

ERNESTIA CONFERTIFLORA Wurdack, sp. nov.

E. minori Gleason, *E. pullei* Gleason, et *E. blackii* Brade & Markgraf affinis, floribus subumbelliforme capitellatis differt.

Suffrutex 0.2-0.4 m altus; ramuli subalato-quadrangulati sicut folia inflorescentia hypanthiaque densiuscule glandulosi-pilosuli pilis gracilibus erectis 0.3-1(-1.3) mm longis. Petioli 0.3-1 cm longi; lamina (1.2-)-2-3 X (0.5-)-0.8-2 cm elliptica vel obovato-elliptica apice late acuto vel rotundato basi acuta, firme membranacea et distanter appresso-serrulata, trinervata. Inflorescentia terminalis capitellata (3-)-6-15-flora, bracteis ca. 0.8-1 cm longis subtenta; flores 4-meri breviter (ca. 1 mm) pedicellati, bracteolis 2-3 X 0.6-1 mm oblongis persistentibus. Hypanthium (ad torum) 4-4.5 mm longum; calycis lobi 2 X 1.4 mm oblongo-ovati intus apicem versus sparse glanduloso-setulosi. Petala 6-7 X 4-4.5 mm elliptico-rhomboidea apice late acuta vel rotundata setula unica glandulifera 0.3-0.7 mm longa terminata. Stamina dimorphica glabra; filamenta 5.2-5.7 vel 4-5 mm longa; antherarum thecae 5-5.5 vel 4-4.2 X 0.4 mm subulatae, poro ventraliter inclinato; connectivum usque ad filamenti insertionem 1.2-1.8 vel 0.6-0.7 mm prolongatum in staminibus maioribus ad basin dorsaliter tuberculatum, appendicibus duabus ventralibus aristiformibus 3 vel 2.3-3.5 mm longis in staminibus maioribus basin versus ca. 0.6 mm inflatis. Stigma punctiforme; stylus glaber 11-12 X 0.2-0.3 mm; ovarium 3-loculare glabrum; semina 0.7-0.8 X 0.6 mm manifeste (ca. 0.1 mm) muriculata.

Type Collection: *W. A. Egler* 47644 (holotype US 2400281; isotype NY), collected in soil-filled depression on large granitic outcrop at Roche Mon Pere, 3° 33' N, 52° 5' W, Rio Oiapoque, Terr. Amapá, Brazil, 17 Aug. 1960. "Subshrub; leaves glutinous; flowers pink."

Paratypes (all Amapá, Brazil): *Ph. v. Luetzelburg* 20273 (M) and 20398 (M), both from "Roche Monpère"; *Pires, Rodrigues & Irvine* 50980 and 51143 (NY), both from rocks below Porto Platon, Rio Araguari; *Pires & Westra* 48819, from granitic outcrop near Mt. Carupina, Rio Oiapoque.

Ernestia minor has cordulate 5-nerved leaf blades, lax few-

flowered inflorescences, and flowers with linear-lanceate sepals (3 X 0.6-0.8 mm) and non-inflated ventral appendages on the stamens; E. pullei has 5-nerved leaf blades with rounded bases, well-developed panicles, and oblong-subulate calyx lobes; and E. blackii (ex char.) has flowers in foliose panicles, connectives long-produced in the large stamens, and styles glandular-pilose. All three suggested relatives share with E. confertiflora the feature of glabrous 3-celled ovaries; the other two species of Ernestia having this ovarial feature, E. glandulosa Gleason and E. cordifolia Berg ex Triana, are more distantly related.

TIBOUCHINA RIGIDULA (Naud.) Wurdack, comb. nov.

Lasiandra rigidula Naud., Ann. Sci. Nat. ser. 3 Bot. 13: 150. 1850.

Cogniaux evidently followed Triana's lead in synonymizing Naudin's species under T. aemula (DC.) Cogn.; the latter is quite a different species vegetatively and in floral structure. Naudin's remarks about the affinities with Lasiandra fontanesiana (Bonpl.) DC. are quite true. The species may be characterized by the finely strigulose upper leaf surfaces (not at all bullate), roughened erect hairs on the lower leaf surfaces, slightly roughened hypanthial hairs, moderately villose-lanate (the hairs caducously gland-tipped) filaments, and the nearly glabrous style; probably the best placement in Cogniaux' monograph would be (ex char.) near T. formosa Cogn. The type locality for T. rigidula, "Villa Principe", is equivalent to present-day Serro in Minas Gerais between Itabira and Diamantina; a recent collection from the same region is Irwin, Maxwell, & Wasshausen 20331 (Serra do Cipó, km 132 ca. 153 km north of Belo Horizonte). Macbride photograph 36149 is of the holotype of Lasiandra rigidula, the collection without number; a duplicate (P) has the St. Hilaire number B¹ 996.

Incidentally, I am exceedingly skeptical that T. aemula, T. valtheri Cogn., and T. adamantinensis Brade can be distinguished from one another; indeed, one Vauthier collection cited by Cogniaux as T. aemula (Vauthier s.n., P) comes from the type locality, Marianna (M. Gerais) of T. valtheri; at Paris I noted that Mexia 5703 and 5788 are good matches for the type collection of T. valtheri. Unfortunately no detailed notes were taken at Munich on the holotype (Macbride photograph 6347) of T. aemula.

TIBOUCHINA VIMINEA (D. Don) Cogn.

The only Don-annotated material seen is a specimen in the Fielding Herbarium at Oxford, also annotated by Joseph Hooker; the locality data are "Brazil" and "Liverpool" (?), with no collector indicated. At Munich are two sheets of cultivated material (Presl Herb. s.n. and Hort. Monac. s.n.), both showing somewhat more robust plants than the Oxford collection. A wild collection which is an excellent match for the Fielding Herbarium specimen is L. B. Smith 1532 (Soberbo-Guapy, Organ Mountains, Rio de Janeiro).

MONOCHAETUM MAGDALENENSE Wurdack, sp. nov.

Sect. Grischowia. M. meridensi (Karst.) Naud. in floribus affinis, trichomatibus barbellatis foliis 7-9-plinervatis hypanthiis glabris differt. M. laxifolio Gleason in trichomatibus affinis, foliis maioribus hypanthiis glabris staminibus minoribus sterilibus differt.

Frutex 1.5-3 m; rami robusti acute tetragoni sicut petioli foliaque sparse vel modice strigulosi (ramis demum glabratis) pilis plerumque 0.5-1 mm longis basim versus modice barbellatis (basi ipse substellata) apicem versus laevibus; ramorum inflorescentiarumque nodi dense setosi pilis gracilibus 2-4 mm longis. Petioli 1.5-3.5 cm longi; lamina 6-12 X 3-5.5 cm elliptico-ovata apice acuto basi obtusa vel rotundata, integra et firme chartacea, breviter 7-9-plinervata pari interiore 0.5-1 cm supra basin divergenti. Panicula 10-28 cm longa multiflora, ramis principalibus tetragonis nodis exceptis subglabris, ramulis glabris, bracteis 1-2.5 cm longis ellipticis mox caducis, bracteolis 0.4-0.8 X 0.2-0.35 cm mox caducis ciliolatis alioqui glabris, pedicellis 0.3-0.4 cm longis glabris. Hypanthium 8-9 X 3 mm glabrum; calycis lobi 7-7.4 X 3-4 mm lanceati vel ovato-lanceati breviter modiceque ciliolati alioqui glabri; torus extus plerumque in quoque sinu calycino pilis 1-2 gracilibus 0.5-1 mm longis armatus. Petala 12-15 X 12 mm obovata, apice late obtuso et setula unica 0.5-0.7 mm longa mox caduca armato. Stamina dimorphica glabra. Stamina maiora: filamenta 5.2-9 mm longa; thecae 11.5-12 X 1 mm, connectivo ca. 1 mm prolongato, appendice dorsali 3-3.5 X 0.6 X 0.8 mm. Stamina minora: filamenta 9-10 mm longa; thecae 5-5.3 X 0.25 mm steriles, appendice dorsali 1.4-2.2 X 0.2-0.4 X 0.7-1 mm complanata. Stigma punctiforme; stylus glaber 19.5-20 X 0.6-0.7 mm; ovarium apicem versus densiuscule strigosum pilis gracilibus barbellatis usque ad 1.8 mm longis.

Type Collection: S. Díaz Piedrahita 165 (holotype US 2582690A; isotype COL), from cloud forest, "Sierra Nevada de Santa Marta, Parque Nacional de Santa Marta, Cuchilla de San Lorenzo, alrededores del Centro Forestal," Depto. Magdalena, Colombia, elev. 2300 m, 19 June 1969. "Pétalos lila; filamentos blancos; estambres amarillos; pistilo roja; cáliz púrpura. Hojas verde limón."

Paratypes (all topotypical): Gonzalo Aguirre-S. 601 (US, COL); Gustavo Lozano-C. 997 (US, COL); W. Seifriz 102 (US).

Monochaetum meridense shows stamen dimorphism similar to that in M. magdalenense, but has smooth trichomes, 5-plinerved leaves, and sparsely strigulose hypanthia. Monochaetum laxifolium has barbellate pubescence, but much smaller leaf blades, sparsely strigulose hypanthia, eciliate sepals, and subisomorphic stamens which are all fertile. Monochaetum uberrimum Sandwith, the holotype of which (K) has been examined, differs from M. magdalenense in the smooth hairs, smaller 5-plinerved leaves (but perhaps immature on the holotype), sparsely strigulose hypanthia, relatively longer appendages on the large stamen connectives, and at least semifertile small stamens.

Directly involved with M. uberimum are two recent Magdalena collections (Romero Castañeda 854, from San Sebastián de Rábago; Cuatrecasas & Romero Castañeda 24706, from Cúcuta), with smooth pubescence, large leaves, glabrous hypanthia, and semi-sterile anthers in the smaller stamens; further study seems stymied until topotypical collections of M. uberimum appear. For the present, the strongly roughened pubescence of M. magdalenense distinguishes it from all other taxa with deciduous sepals treated by Gleason (and also M. gleasonianum Wurdack) except M. laxifolium (Am. Jour. Bot. 16: 519-522. 1929).

GRAFFENRIEDA URIBEI Wurdack, sp. nov.

G. tamanae Wurdack affinis, foliorum laminis ad basim in petiolos decurrentibus subtus pilis simplicibus sparse armatis floribus sessilibus differt.

Rami robusti sicut folia inflorescentia hypanthiaque modice appresso-squamulosi glabrati. Petioli 2.5-3 cm longi robusti ob laminas decurrentes apicem versus anguste alati; lamina 14-45 X 8-34 cm elliptica vel elliptico-ovata apice acuto vel obtuso basi late acuta vel obtusa, subcoriacea et integra, supra demum glabrata, subtus in superficie densiuscule resinoso-glandulosa et sparse pilis laevibus 0.7-1.3(-2) mm longis induta, breviter (1-2 cm) 5-plinervata (pari exteriori debili inframarginali neglecto) nervis secundariis 0.5-1 cm inter se distantibus venulis subtus laxè obscureque reticulatis (areolis 2-5 mm latis). Panicula usque ad 51 cm longa multiflora e basi furcata vel longe pedunculata; flores 4-meri sessiles, bracteolis ca. 1.5 mm longis ovato-oblongis mox caducis. Hypanthium (ad torum) 3 mm longum indistincte 8-costatum; calyx in alabastris clausus conicus tenuis demum in lobis (3-)4 ovatis 1-1.5 mm longis persistentibus dehiscens. Petala glabra 3-3.6 X 2-2.2 mm oblongo-obovata, apice obtuso vel rotundato et inconspicue mucronato. Stamina isomorphica glabra; filamenta 2-2.2 mm longa; thecae 3.3-3.4 X 0.8 mm, poro 0.3 mm diam. ventraliter inclinato; connectivum non prolongatum, dente dorsali subulato acuto 0.7-0.8 mm longo. Stigma punctiforme; stylus 7.6-8 X 0.4-0.15 mm glaber; ovarium 4-loculare, apice rotundato et paulo (0.2 mm) emarginato.

Type Collection: Lorenzo Uribe Uribe 5638 (holotype US 2574327A, 2574328A), collected in dark damp forest ca. 4 km northeast of Arcabuco, Depto. Boyacá, Colombia, elev. 2700 m, 8 June 1966. "Arbusto hasta de 4.5 m de altura. Cada rama es vertical y sencilla; o hay ramificación hacia la mitad con ramas de nueva verticales. Flores con pétalos blancos y estambres de color amarillo claro."

Graffenrieda tamana has leaf blades which are basally nerved and not decurrent on the petioles, as well as pedicellate flowers; the other close relative, G. emarginata (R. & P.) Triana has basally cordulate leaf blades and defined granulose-pinoid pubescence. From both species, G. uribei differs in the sparse simple pubescence on the lower leaf surfaces. Arcabuco evidently is a pocket of species endemism (see also Monochaetum

uribei subsp. arcabucense Wurdack) which Padre Uribe is sampling admirably.

MICONIA AMACURENSIS Wurdack

Wachenheim 100 (P), from Crique Jacques, French Guiana, agrees with Venezuelan and Brazilian collections of M. amacurensis in all essential features, differing only in the shallowly and distantly undulate-denticulate leaf margins. This collection gives M. amacurensis a more continuous known distribution along the northeastern coast of South America (Phytologia 18: 150. 1969).

MICONIA INAEQUALIFOLIA Triana

The holotype (K) is comparable with several recent Colombian (Schultes & Cabrera 16685 and 19825, both from Jinogojé, Río Apaporis, Amazonas-Vaupés, fruiting) and Brazilian (Krukoff 8936, from São Paulo de Olivença, Amazonas, in bud) collections. The Brazilian material was mentioned by Gleason in the original description of M. filamentosa Gleason and indeed that species may well be only a minor variant of M. inaequalifolia with leaf blades 3-nerved and tapering to a narrowly rotund base. No floral differences are evident between the species, the ovaries of both being predominantly 3-celled despite Gleason's description (Bull. Torrey Club 65: 579. 1938). The Colombian collections of M. inaequalifolia had earlier been cited by me under M. filamentosa (Rhodora 65: 19. 1963). Another variant in this complex (with slightly larger flowers, more prominent external calyx teeth, and slightly different connective appendages on the large stamens, but foliage as in M. filamentosa) has twice been collected in subandean Colombia (Río Ortequaza, Caquetá, Cuatrecasas & Soderstrom 27146; Solano, Putumayo, Little & Little 9742) and should perhaps also be compared (ex char.) with M. sprucei Triana.

MICONIA IBAGUENSIS (Bonpl.) Triana

Clidemia virgata Pittier, Bol. Soc. Ven. Cienc. Nat. 11: 24. 1947.

Strangely enough, both sheets (US, VEN) examined of Pittier 13020 had been correctly determined by Pittier in Miconia, the description in Clidemia thus an apparent lapsus; the Caracas specimen shows young lateral growth overtopping the morphologically truly terminal inflorescence. As is to be noted in detail elsewhere, the Bonpland holotype of M. ibaguensis was actually collected in Edo. Sucre, Venezuela, rather than Colombia.

MICONIA MACDANIELII Wurdack, sp. nov.

Ut videtur M. decipienti Cogn. in pubescentiae forma affinis, foliis non plinervatis manifestius petiolatis differt.

Ramuli primum sulcato-quadrangulati demum teretes sicut petioli foliorum subtus venae primariae inflorescentia hypanthiaque dense stellato-puberuli pilis sessilibus ca. 0.25 mm

diam. Petioli 4-5.5 cm longi robusti; lamina 25-30 X 10-14 cm, rigide membranacea et integra, stellato-ciliata, oblongo-elliptica apice breviter (1-1.5 cm) gradatim angustaeque acuminate basi late acuta, supra glabra (in nervis primariis caduce stellato-puberula), subtus densiuscule persistenterque stellato-puberula pilis ca. 0.8 mm diam., 5-nervata nervis secundariis ca. 5-7 mm inter se distantibus nervis tertiariis subtus paulo elevatis nervulis planis areolis ca. 0.6-0.8 mm latis. Panicula multiflora 17-25 X 20 cm, ramis primariis oppositis ramulis sparse glanduloso-setulosis (setulis glanduliferis 0.5-0.8 mm longis, demum caducis?), bracteis ovato-ellipticis 8-12 mm longis valde caducis, bracteolis ca. 4-5 X 1 mm valde caducis; flores 5-meri ad ramulorum apices plerumque terni, pedicellis crassis 0.5-1 mm longis. Hypanthium (ad torum) ca. 3.7 mm longum; calycis tubus 0.3-0.4 mm altus, lobis interioribus 0.4-0.5 mm longis triangularibus, dentibus exterioribus adnatis non eminentibus. Petala 2-2.2 X 1.4-1.8 mm obovata (apice rotundato) glabra vel apicem versus ad margines obscure stellulato-ciliolata. Stamina in forma isomorphica in dimensionibus paulo dimorphica glabra; filamenta 5-5.5 vel 3.2-3.5 mm longa; antherarum thecae 4 vel 3.3-3.6 X 0.4 mm paulo subulatae et curvatae, poro unico minuto; connectivum non prolongatum ventraliter per 0.5-0.6 mm thecae basibus coalitum. Stigma paulo expansum 0.6 mm diam.; stylus glaber 10 X 0.4 mm in ovarii apicem 0.3-0.4 mm immersus; ovarium 3-loculare, $\frac{1}{2}$ inferum, apice setulis sparsis glanduliferis 0.1-0.3 mm longis armato.

Type Collection: Sidney McDaniel 10833 (holotype US 2562681), collected in non-inundated river bank forest at Intuto, Rio Tigre, Depto. Loreto, Peru, elev. 160 m, 9 Aug. 1968. "Shrub to 5 m; corolla white."

Paratype (topotypical): McDaniel 10780 (fruiting), 4 Aug. 1968.

Miconia decipiens, endemic to Colombia (Antioquia), has 5-plinerved leaf blades with short (ca. 1 cm long) petioles, as well as glabrous ovary apices. The general vegetative aspect and stamens of M. macdanielii are rather like those in M. stelligera Cogn. sens. lat., which has rather smaller leaf blades with sparser lower surface pubescence, a somewhat different inflorescence pattern, petals moderately stellulate-puberulous outside, and moderately stellulate-puberulous ovary apices; also there is a different size distribution of vegetative pubescence, even considering the variants earlier discussed by me (Phytologia 9: 417. 1964). Vegetatively, especially in leaf venulation (but not in reproductive features), M. dispar Benth. (with however denser foliar pubescence) resembles M. macdanielii. In the Flora of Peru, M. macdanielii would perhaps key to near M. zubenetana Macbride, which really is not closely related, having leaf blades essentially glabrous except for the very fine stellulate hairs on the primary veins beneath, smaller flowers, and basally prolonged anther connectives. The taxonomic importance of the glandular inflorescence hairs is perhaps minimal, such hairs being almost completely absent in

the fruiting paratype.

MICONIA SHATTUCKII Standley

Long considered endemic to Barro Colorado Island, Panama (a recent topotype being Ebinger 198), *M. shattuckii* is now recorded for Colombia (Haught 4927, from Turbo, Antioquia, elev. 200 m). The recent collections have provided floral details: hypanthium 2-2.3 mm long, sparsely puberulous with pinoid hairs 0.1-0.2 mm long; calyx tube 0.5 mm long, the broadly ovate interior lobes 0.2 mm high, the minute external teeth infirmarginal; torus within sparsely glandular-puberulous; petals 4.2-4.3 X 2.3 mm, obovate-oblong with rounded apex, glabrous; stamens isomorphic, glabrous; filaments 3 mm long; thecae 1.9-2 X 0.6 X 0.5 mm, oblong, with a minute dorsally tipped pore; connective neither prolonged nor appendaged; stigma truncate, not expanded; style 5.3 X 0.4 mm, sparsely glandular-puberulous (the hairs ca. 0.2 mm long) at the base; ovary 5-celled, 3/4 inferior, with a sparsely glandular-puberulous apex. The flexuous cauline hairs are sparsely barbellate and very minutely and caducously gland-tipped. Obviously *M. shattuckii* should be placed in Sect. *Amblyarrhena* and in Cogniaux' Monograph would key to ca. species 361-363, differing from all these in vegetative and floral details.

MICONIA OBSCURA (Bonpl.) DC.

Miconia trichrona Macbride, Field Mus. Publ. Bot. 4: 183. 1929.

The type (Bonpland ex herb. Adrien Jussieu, P) and isotype (P) of *M. obscura*, not annotated by Naudin, Triana, or Cogniaux, have been compared with an isotype (US) of *M. trichrona*. Weberbauer 6309 (Cajamarca, Peru) and Maguire & Maguire 44362 (Zamora, Ecuador) match the isotype of *M. obscura*. The species is very closely related to *M. capitellata* Cogn., which has sparsely barbellate (rather than essentially smooth) cauline pubescence, obtusely based plinerved (rather than rounded and basally nerved) leaf blades with somewhat finer pubescence on the upper surfaces, and larger flowers (anthers 2.1-2.3 mm long, dry, rather than 1.2-1.5[-1.7] mm; petals 2-2.1 mm wide rather than 1.5-1.8 mm; stigma 1 mm diam., rather than 0.5-0.7 mm). A good match for the type of *M. capitellata* (P) is Jameson s. n. (US). In both species, the style is loose-strigulose, the filaments glabrous or very sparsely glandular-puberulous on the adaxial side, and the ovary apex moderately setulose. The hierarchical resolutions of other parts of this complex, including *M. aggregata* Gleason and *M. hamata* Cogn., are still pending. The species problem had been discussed in Mem. N. Y. Bot. Gard. 16(1): 20-21. 1967.

CLIDEMIA CAPITELLATA (Bonpl.) D. Don

Clidemia neglecta D. Don, Mem. Wern. Soc. 4: 307. 1823.

Clidemia capitellata (Bonpl.) D. Don var. *neglecta* (Don) L. Wms., Fieldiana Bot. 29: 556. 1963.

After considerable meandering through the large specimen welter in this complex, supplemented by examination of Bonpland's (P) and Don's (MA, OXF) type collections, I cannot see any real differences in the two taxa. As mentioned by Williams, C. neglecta is intermediate between C. capitellata and C. dependens Don, but his key characters of inflorescence branching and underleaf pubescence do not obtain for the type collections. For C. capitellata in the Flora de Venezuela, only the typical variety, var. dependens (Don) Macbride, and var. levelii Wurdack will be recognized. Among modern collections, the best matches (all US) for the types are: C. capitellata var. capitellata, Uribe 3727, from Guaduas (old trail to Honda, the type locality), Cundinamarca, Colombia; C. neglecta, Buchtien 1149, Mapiro region, Bolivia; C. dependens, Tonduz 4561, Boruca, Costa Rica and Prance, Rodrigues, Ramos, & Farias 8857, Mutumparaná, Rondonia, Brazil. Some collections from over a wide geographic range have smaller flowers in very well branched inflorescences and perhaps will require further infraspecific recognition. For the present, Naudin's comments (Ann. Sci. Nat. ser. 3 Bot. 17: 317. 1852) are echoable: "quod tamen posteris solvendum relinquimus."

The location of the Pavón holotypes of the melastomes described by David Don remains problematic. At both the British Museum (Natural History) and Oxford (Fielding Herbarium) are specimens annotated with Don's binomials and "D. Don in Wern. Trans."; the minute handwriting is not that of David Don and has not been immediately identifiable (personal correspondence) by Mrs. Hortense Miller from her research on the Lambert Herbarium (Taxon 19: 489-553. 1970). Thus the current references to Don's type collections are to presumed isotypes. Don's personal herbarium went to the Linnean Society in London but subsequently was purchased by von Martius (Lot 254, Catal. Nat. Hist. Colls. sold by the Linnean Society through J. C. Stevens) on Nov. 10, 1863. However, none of the critical melastome specimens were found at either Brussels or Munich during my European trip in 1969-70, so perhaps Don did not incorporate such materials into his personal collection from his tenure as curator of the Lambert Herbarium. On one of the two Fielding Herbarium isotypes of Clidemia neglecta was penciled (by Mrs. Clokie?) "Herb. Prescott"; Mrs. Miller is inclined to believe (because of the date of Prescott's death) that this sheet probably did not come originally from Don or Lambert. Investigation into the melastome facet of the Lambert-Don history is being continued by Mrs. Miller.

CLIDEMIA STRIGILLOSA (Sw.) DC.

Clidemia umbonata DC., Prodr. 3: 158. 1828.

From the pubescence, well-developed interior calyx lobes and external teeth, non-prolonged anther connectives, and glandular-setulose ovary apices, the Martius type (M) of C. umbonata seems to represent a form of C. strigillosa with lax fruiting inflorescences. The type collection is from Nogueira,

the Macbride photograph (6439) being of another gathering. Some of the central Brazilian material cited by Cogniaux as C. umbonata really represents a dodecandrous relative of C. bullosa DC. (sensu Wurdack); a phytogeographic aberrancy of this undescribed taxon has also been collected in Venezuela (El Paito, Carabobo, B. Trujillo 4835-Herb. Maracay). Because of complications with C. biserrata DC. (the current Brazilian specimens, including collections cited by Cogniaux, showing stamen numbers of 10-15 and ovary apices sparsely glandular-setulose as well as stellulate-puberulous) and C. bullosa (pleiostemonous, with ovary apices lacking glandular setulae), this taxon (including Braga 1048 from Paraná, Pohl 1172 from Minas Gerais, and Macedo 1449 from Goiás in Brazil; Rojas 3649 and Krapovickas, Cristobal, & Ahumada 14257 from Paraguay; Trujillo 4835, vide supra) has not been further evaluated.

CLIDEMIA URCEOLATA DC.

As already indicated, C. neglecta D. Don is part of the C. capitellata complex. However, the species treated by Cogniaux as C. "neglecta" is distinct and well typified by the Martius collection (M) of C. urceolata from Rio de Janeiro, Brazil. The Raddi collections (FI) cited (Mem. Mod. 20: 161. 1829) as Leandra strigillosa (Sw.) Raddi are actually C. urceolata, rather than (as cited by Cogniaux in synonymy) C. umbonata DC. In typical form, the species is known from Honduras (Molina 328, 10096, 14133; Williams & Molina 23255; Meyer 9920), British Honduras (Bartlett 11300; Lundell 6870; Hunt 210), Panama (Ebinger 424), Cuba, Venezuela (Carabobo, Nueva Esparta, Bolívar), Trinidad, Colombia, and most of southeastern Brazil. Upland Guayana Highland (Venezuela) and Santander (Colombia) collections are aberrant (and probably infraspecifically distinct), having upper leaf surfaces moderately stellulate-puberulous and very sparsely glandular-setulose, lower leaf surfaces and hypanthia very densely stellate-puberulous, and ovary apices very inconspicuously glandular-setulose. The species is distinguishable from the forms of C. capitellata with much-branched inflorescences by the inconspicuous subulate to narrowly oblong inflorescence bracteoles and denser glandular pubescence.

CLIDEMIA PUSTULATA DC.

For the Flora de Venezuela, Cogniaux' interpretation of C. pustulata is being followed, although I have seen no recent Brazilian (or other) collections exactly comparable to the holotype (M); Martius' specimen shows hypanthia very densely glandular-setulose (ca. 1 mm), external calyx teeth projecting ca. 1 mm, corolla sparsely glandular-setulose (0.2-0.3 mm) externally, stamens (perhaps malformed in the one flower examined) with connective barely (0.2-0.3 mm) prolonged, and 5-celled ovary 2/3 inferior and moderately glandular-setulose (0.5-0.6 mm) apically. The Cogniaux concept encompasses material from Costa Rica (Skutch 4094; Pittier 10561, 12001),

Panama (Burch, Oliver, & Robertson 1330; Allen 2509), Colombia (Uribe 4961), Venezuela (Bolívar), Trinidad, Tobago, Guyana, and Brazil (Roraima). Probably C. pustulata sensu Cogniaux is only varietally distinct from C. urceolata, differing in the short even cauline and foliar pubescence and slightly smaller flowers with short external calyx teeth; decisive naming of specimens between the two taxa is often difficult. Both C. urceolata and C. pustulata have a yellow pigment (from the glandular hair tips?) often staining newsprint and herbarium sheets, a feature not seen in related species.

CLIDEMIA NOVENNERVIA (DC.) Triana var. AFFINIS (Naud.) Wurdack, comb. nov.

Staphidium affine Naud., Ann. Sci. Nat. ser. 3 Bot. 17: 313. 1852.

Clidemia affinis (DC.) Cogn., Mart. Fl. Bras. 14(4): 493, pl. 104, fig. 1. 1888.

Gleason (Brittonia 1: 167. 1932) treated both C. novennervia and C. affinis as synonyms of C. umbonata (vide supra sub C. strigillosa); however both taxa are characterized by the stamen connectives prolonged 0.7-1.2 mm (but not appendaged) and the ovary apices stellulate-puberulous but without prominent glandular setulae, thus differing from both C. strigillosa (Sw.) DC. and C. urceolata DC.-C. pustulata DC. The holotype of C. novennervia (P) was collected by Ferreira in Brazil and is well matched by Schultes & Cabrera 12714 (Soratama, Río Apaporis, Amazonas-Vaupés, Colombia). The typical variety is characterized by the essentially sessile flowers with the hypanthium ca. 3 mm long, the interior calyx lobes 1.2-2 mm long and the external teeth projecting 1.3-2 mm, the ovary apex with an abrupt densely stellulate-puberulous collar 0.4-0.5 mm long; var. affinis has the flowers usually on evident slender pedicels, the hypanthium ca. 2.5 mm long, the interior calyx lobes 0.4-0.7 mm long and the external teeth projecting 0.3-0.8 mm, the conic ovary apex with a scarcely differentiated sparsely stellulate-puberulous collar 0.3 mm high. Some intermediates exist between the varieties, which however are generally well-marked. Cogniaux' C. affinis var. angustifolia does not merit recognition. The typical variety of C. novennervia has a disjunct range: British Honduras, Colombia (Santander, Vaupés, Amazonas), Venezuela (Amazonas, Bolívar), Brazil (Roraima, Amazonas, Rondônia). The Central American population (C. reticulata Gleason, Brittonia 3: 110. 1939) (also including Nicaragua fide Williams, the Stanley collection not seen by me) was treated in the Flora of Guatemala (see also Fieldiana Bot. 29: 560. 1963) as a synonym of C. strigillosa; the latter is known to me from much of Central America (Guatemala, British Honduras, Honduras, Nicaragua, Panama).

CLIDEMIA EPIBATERIUM DC.

The original description cited obtuse petals and auricled

anther bases; examination of the holotype (M) and the Geneva fragments (G-DC, with separate open flower) shows, however: petals oblong-lanceate, rounded at the apex, 2.5 X 0.6 mm, externally sparsely setulose on the carina, with an external infra-apical setulose mucro 0.7-1 mm long; anther connectives not appendaged, not or barely (0.1 mm) prolonged. Recent Venezuelan (Steyermark 75362, Bernardi 2662, Steyermark 90258, all Edo. Bolívar), Colombian (McDaniel 11420, Depto. Amazonas) and Peruvian (Killip & Smith 29885, Loreto) collections agree with the Martius collection from "Porto dos Miranhas, Rio Negro in regione Japurensi." Cogniaux thought that C. epibaterium DC. var. parvifolia Cogn. might prove to be a distinct species rather than a foliar variant; however an isotype (Spruce 2239, NY) shows flowers exactly like those of Steyermark 75362. Placement of this species in Clidemia is perhaps problematic and Ossaea duckeana Hoehne is probably synonymous; similar petals also are found in Ossaea boliviensis (Cogn.) Gleason, as well as Leandra aristigera (Naud.) Cogn. Certainly Maguire 23228, distributed as O. duckeana, is conspecific with C. epibaterium, the US sheet of this Kaieteur Plateau collection however having larger leaves and inflorescences than usual.

CLIDEMIA GLOBULIFLORA (Cogn.) L. Wms.

C. reflexa Gleason, Brittonia 3: 119. 1939.

CLIDEMIA SPECTABILIS Gleason

Maieta setosissima Suessenguth, Bot. Jahrb. 72(2): 277. 1942.

As previously alluded (Phytologia 19: 194. 1969), the correct synonymy for the two Costa Rican species of Clidemia requires adjustment. I have since seen the holotypes of both Cogniaux' and Suessenguth's species (Pittier 207-BR and Kupper 772-M, respectively) and have confirmed that the reshuffling above cited is correct and not that suggested earlier (Fieldiana Bot. 29: 556. 1963). Also examined for C. globuliflora were two specimens of Pittier 3 (G-BOISS), which have the same locality and collection date as Pittier 207 and are probably the same gathering (see DC. Mon. Phan. 7: 1192. 1891; Macbride photograph 36847).

CLIDEMIA JAPURENSIS DC. var. HETEROBASIS (DC.) Wurdack, comb. nov.

Clidemia heterobasis DC., Prodr. 3: 164. 1828.

Oxymeris heterobasis (DC.) Triana, Trans. Linn. Soc. Bot. 28: 95. 1871.

Leandra heterobasis (DC.) Cogn., Mart. Fl. Bras. 14(4): 193. 1886.

Clidemia naevula (Naud.) Triana p. p.

The original material seen by de Candolle was a mixture (as was his description), Cogniaux later recognizing Leandra solenifera Cogn. for the element with 6-merous secund flowers; the leaf in the Prodromus herbarium is of L. solenifera. The

residual element (Martius s. n., M- Macbride photograph 6416; a separate leaf apparently from this collection is on the holotype sheet of Clidemia inaequalifolia DC, a distinct species now placed in Leandra) in Clidemia heterobasis is actually the same as C. naevula (Naud.) Triana sensu Cogniaux and Gleason (Brittonia 1: 165. 1932), having a dense cauline pubescence of only gland-tipped hairs less than 1 mm long. One syntype (Ferreira s. n., P, Macbride photograph 36347, cited by Naudin as collected by Bonpland) conforms to the Cogniaux-Gleason criteria for C. naevula; however, another syntype, Schomburgk 41/72 (P), showing a Naudin dissection sketch, has the longer eglandular hairs characteristic of typical C. japurensis. I doubt that typical C. japurensis was collected on the Rio Japurá, the Martius specimen (despite the holotype label) probably being from the lowermost Amazon. The typical variety is known by many collections only from eastern Venezuela and Brazil (Pará), var. heterobasis from Amazonian Colombia and Peru to British Guiana (also in Nicaragua and Costa Rica). A note on these complexities was published earlier in Mem. N. Y. Bot. Gard. 10(5): 182. 1964.

CLIDEMIA HETERONERVIS (Naudin) Wurdack, comb. nov.

Sagraea heteronervis Naudin, Ann. Sci. Nat. ser. 3 Bot. 18: 98. 1852.

Ossaea heteronervis (Naudin) Triana, Trans. Linn. Soc. Bot. 28: 146. 1871.

Examination of the holotype (Gay s. n., P; Macbride photograph 36318) has shown lance-oblong petals with a rounded apex and a single infra-apical setula 0.5 mm long. In both vegetative and reproductive features, the relations are with C. bernardii Wurdack and its allies (Phytologia 19: 196-197. 1969). Of these relatives, the closest seems to be C. piperifolia Gleason, the Peruvian species differing in the bulla setulae of the upper leaf surfaces 0.8-1 mm long (rather than 0.2 mm), the cauline and petiolar hairs ca. 1.8 mm long (rather than 0.6-1 mm), and the ovary apex glabrous (rather than moderately fine-setulose). As in Leandra aristigera (Naud.) Cogn., Gay's specimen surely did not come from "environs de Lima", but probably Depto. Cuzco.

HENRIETTELLA SEEMANNII Naudin

H. hispidula Cogn., Bot. Jahrb. 8: 30. 1887.

Examination of the holotype (P) and isosyntypes (US) of both species revealed no differences, the slight leaf shape gap easily bridged in recent Central American collections. The typical element of the species ranges from Costa Rica and Panama to Colombia (Antioquia, El Valle, Cauca), collections from elsewhere in Colombia and Ecuador being at least sub-specifically distinct. Henriettella goudotiana Naud. is closely related to H. seemannii but differs in the more obvious stellate bases of the foliar hairs, shorter (averaging 0.4-0.6 mm rather than ca. 1.3 mm) simple tips of the stellate-based hypanthial

hairs, and shorter (ca. 2 mm long dry, rather than ca. 2.5 mm) anthers with broader (equalling the anther width) pores; the petals of both species are puberulent externally. Recent collections of H. goudotiana comparable with the holotype (P) and isotype (FI) are García-Barriga 11704 (Cundinamarca) and Little 7313 (Huila).

HENRIETTELLA OVATA Cogn.

H. longistyla Ule, Notizbl. Bot. Gart. Berlin 6: 366. 1915.

H. micrantha Gleason, Bull. Torrey Club 58: 414. 1931.

None of Ule's criteria for distinction are applicable, as may be seen in the ample series from both north and south of the Amazon (the latter chiefly collected by Irwin and his colleagues). Gleason had already published the synonymization of H. micrantha (Mem. N. Y. Bot. Gard. 8: 143. 1953). The species ranges from eastern Colombia (Meta, Vichada) and Venezuela (Bolívar, Amazonas) to Brazil (Roraima, Pará, Maranhão, Goiás, and Mato Grosso). It is closely related to H. patrisiana (DC.) Naud. (which has calyx lobes strigulose within, shorter hypanthial pubescence, and rostrate anthers) and H. seemanni Naud. (with 3-nerved rather than 5-nerved leaf blades, generally less appressed cauline pubescence, and rather persistent foliar hairs).

OSSAEA MAVACANA Wurdack, sp. nov.

In systemate Cogniauxii O. angustifoliae (DC.) Triana affinis, foliis 5-plinervatis ramorum inflorescentiarum pilis caduce glanduliferis ovario 6-loculari differt.

Ramuli teretes sicut petioli foliorum venae primariae supra et subtus densiuscule setulosi (pilis gracilibus laevibus ca. 1-1.5 mm longis caduce glanduliferis) et modice glanduloso-puberuli pilis 0.1-0.4 mm longis. Petioli 1-1.6 cm longi; lamina 6-10(-16) X 3-5(-7.5) cm elliptica apice subgradatim (per 1-1.5 cm) acuminato basi acuta, membranacea et integra vel obscure undulato-serrulata, ciliata, supra sparsiuscule setulosa pilis ca. 1 mm longis, subtus modice setulosa pilis ca. 1 mm longis pro parte caduce glanduliferis, breviter (0.5-1.2 cm) 5-plinervata nervis secundariis ca. 4-5 mm inter se distantibus nervulis subtus planis areolis 0.3-0.4 mm latis. Flores in foliorum superiorum axillis plerumque bini sessiles 6-meri bracteis 4 persistentibus anguste ovatis glanduloso-setulosis (pari exteriori 6 X 3 mm, pari interiori 5 X 2.5 mm) involucrat. Hypanthium (ad torum) 4 mm longum dense subsericeo-strigosum pilis 2-2.5 mm longis gracilibus caduce glanduliferis; calycis limbus 0.8 mm altus non vel vix undulatus graciliter ciliolatus, dentibus exterioribus subulatis 2.7-3 mm eminentibus dense setulosis. Petala 3 X 1.2 mm glabra oblongo-lanceata anguste acuta extus dente subapicali 0.3 mm eminenti armata. Stamina isomorphica glabra; filamenta 2 mm longa; antherarum thecae 2 X 0.6 X 0.3 mm ventraliter 0.4 mm infra filamentum insertionem prolongatae, connectivo simplici. Stigma truncatum non

expansum; stylus glaber 6.3 X 0.3-0.4 mm; ovarium 6-loculare omnino inferum apice glabro styli rostro ca. 0.4 mm alto.

Type Collection: J. Lizot 166 (US 2576226A; isotype VEN), collected at the Río Mavaca, Terr. Amazonas, Venezuela, December 1969.

Ossaea angustifolia, endemic to southeastern Brazil, has eglandular pubescence, narrower 3-plinerved leaf blades, interior calyx lobes 0.3 mm long, and 4-celled ovaries. Certainly O. mavacana is an anomalous species, disparate within a heterogeneous "genus" and with no obvious close relative. The glandular tips on the trichomes are tiny and inconspicuous, much smaller than those in Clidemia involucreata DC. (which somewhat resembles O. mavacana in vegetative aspect, but not in floral structure).

OSSAEA QUINQUENERVIA (Mill.) Cogn.

Melastoma quinquenervia Mill., Gard. Dict. ed. 8, sp. 15. 1768.

Melastoma diversifolia Bonpl., Melast. 138, pl. 59. 1816.

Clidemia? diversifolia (Bonpl.) DC., Prodr. 3: 159. 1828.

Staphidium diversifolium (Bonpl.) Naud., Ann. Sci. Nat.

ser. 3 Bot. 17: 322. 1852.

Clidemia? decurrens Beurl., Act. Holm 127. 1854.

Octopleura quinquenervia (Bonpl.) Triana, Trans. Linn.

Soc. Bot. 28: 145. 1871.

Octopleura diversifolia (Bonpl.) Triana, Trans. Linn. Soc.

Bot. 28: 145. 1871.

The holotype of Melastoma quinquenervia (BM; Bailey Hortorium photograph 5192) is quite compatible with more recent collections of O. diversifolia, a good match (except for the somewhat larger leaves) being H. H. Smith 4 (Santa Marta, Colombia). The Miller type shows upper leaf surface hairs rather sparse and ca. 1.5 mm long, hypanthia furfuraceous but not setulose, and calyx lobes with a few setulae. The commonly applied binomial for this species, O. diversifolia, is thus a synonym. From some herbarium notes of E. P. Killip, it seems perhaps doubtful that Clidemia cyanocarpa Benth. should be included in the synonymy of O. quinquenervia and that comparison is needed with C. purpurea D. Don (and probably C. haughtii Wurdack); however, the Barclay type has not been examined by me.

BLAKEA QUADRANGULARIS Triana

B. sphaerica Gleason, Phytologia 3: 358. 1950.

The holotype (Triana 4110, BM) from Antioquia represents a young sharply quadrate branchlet with intact peduncle; the separate young fruit in the packet show the large bracts (outer 22 X 22 mm; inner 23 X 10 mm) and nearly truncate (the sepalar apiculus to 2 mm long) calyx limb. Most recent material does not show elongated internodes, the very young branchlets being quadrate but becoming indistinctly quadrangular with age. Evidently Lehmann 7223 (Macbride photograph 17297), distributed under an unpublished Cogniaux name, is also B. quadrangularis;

also there are several additional recent collections from Antioquia.

Blakea quadrangularis was one of Triana's "lost" species, known to Cogniaux and Gleason only from the original description. Triana's personal herbarium of 8,000 specimens was sold by his widow to the British Museum (Natural History), the purchase for 240 pounds being authorized on Feb. 26, 1891; thus Cogniaux apparently never saw this collection. Through the courtesy of Mr. Marshall and Mr. Cannon, a xerox copy of the melastomes entered in Triana's herbarium book was obtained. Triana evidently did not give field numbers to his specimens, but later arranged them in Endlicher-genus order and then assigned collection numbers; thus the Melastomataceae are in Endlicher genera 6169-6261, the specimens numbered 3847-4114 (with 4099-4114 a postscript miscellany). Triana's notes also include the species name, locality and elevation of collection, and number of duplicates. Unfortunately the Endlicher numbers alone are often cited as Triana's collection numbers. Triana also numbered his collections within each genus, starting with 1; thus the collection number of Topobea subscaberula could be cited as 4084 or 6261.5; Cuatrecasas has done such citation from the Bogota set of Triana specimens. For the Melastomataceae, the London specimens of Triana's collections have been regarded by me as the holotypes for those species described by Triana from his own gatherings (but not necessarily for Triana species based on material of other collectors); many specimens not found in other herbaria (COL, K, P, W) are in this set.

TOPOBEA MORTONIANA Wurdack, sp. nov.

De affinitate intima mihi incognita, sed ob folia crassa cordata subsessilia flores multifasciculatos bene distincta.

Ramuli teretes primum setis robustis incurvis 1-2.5 mm longis armati mox glabrati; nodi dense setosi, pilis robustis 3-5 mm longis et basim versus 0.2-0.5 mm diam. Folia isomorphica subsessilia, petiolis 0.5-1 cm longis robustis; lamina 11-20 X 7-13 cm ovata vel oblongo-ovata apice late acuto vel obtuso interdum breviter (0.3-0.4 cm) mucronulato-acuminato basi 1-2 cm cordata, rigida et integra, glabra, 5-nervata (pari exteriore inframarginali neglecto) nervis secundariis laxis ca. 5 mm inter se distantibus. Flores 6-meri plerumque in nodis infra folia multifasciculati (16-)24-30(-60) in quoque nodo, pedicellis ad anthesim 1.5-2.5 cm longis gracilibus sparse caduceque pinoideo-furfuraceis; bractee usque ad basim liberae suborbiculares calyci breviores, exteriores 3.2 X 5 mm basim versus extus sparse caduceque appresso-setulosae, interiores 4.3-4.5 X 4.6-4.8 mm apicem versus sparsissime caduceque pinoideo-furfuraceae. Hypanthium (ad torum) 4 mm longum, extus sparse caduceque stellulato-furfuraceum; calyx in alabastris truncatus extus inconspicue 6-dentatus, ad anthesim in lobis 3.2 X 2.7 mm ovato-oblongis usque ad ca. 1 mm supra torum dehiscens. Petala glabra 9 X 5.6-6.3 mm oblongo-obovata apice rotundato. Stamina isomorphica glabra; filamenta 6 mm longa;

antherae inter se cohaerentes 3.8-4.1 mm longae apicem versus graciliter subulatae ad basim ca. 1.3 mm latae, poris duobus dorsaliter inclinatis, connectivo ad basim dente 0.3 mm longo armato. Stigma non expansum; stylus 7 X 0.2 mm glaber; ovarium 4-loculare $1/3$ inferum, apice conico 2.8 mm alto glabro truncato sine collo.

Type Collection: Bassett Maguire & Celia K. Maguire 61846 (holotype NY, 2 sheets; isotype US), collected in wet cloud forest 7 km north of Altaquer along road to Barbacoas, Depto. Nariño, Colombia, elev. 1250 m, 17 Oct. 1969. "Scandent shrub to 10 m, cauliflorous; petals 6, white."

Of the described species of Topobea, T. brenesii Standl., T. cordata Gleason, and T. elliptica Gleason (all from Central America) have sessile leaves, but differ otherwise widely. Certainly T. mortoniana is not closely related to T. sessilifolia Triana, the holotype (BM) of which has sharply quadrangular branches, lance-oblong leaves 4-6 cm wide with secondary nerves only 1 mm apart, and solitary (fide Triana) flowers on peduncles 4-6 cm long with capitellate stigmas. Topobea setosa Triana has leaf blades of about the same shape as those of T. mortoniana, with secondary veins wide-spaced, but shows well-developed petioles, leaf blades discolorous-puberulous beneath, and much larger solitary or few-fasciculate flowers with stout-setose bracts and calyx lobes. C. V. Morton for a decade has amiably monitored and adjusted my descriptions, nomenclature, and bibliographic problems in neotropical research; two generations of tropical students have benefited from his own extensive publications and anonymous courtesy. Thus it is appropriate that a current botanist follow Standley's 1938 example (Clidemia mortoniana) in the Melastomataceae.

BOOK REVIEWS

Alma L. Moldenke

"THE PLANT HUNTERS" - Being a History of the Horticultural Pioneers, their Quests and their Discoveries from the Renaissance to the Twentieth Century by Alice M. Coats, 400 pp., illus., McGraw-Hill Book Company, New York, N. Y. 10036. 1970 (in U.S.A.; 1969 in London by Studio Vista Ltd.). \$10.95.

In the foreword Miss Coats describes the "average" horticultural collector as one well schooled and skilled in botany, gardening and some other sciences such as medicine, surveying, etc. "He had to be adaptable and able to get on with natives, and his life often depended on his being a good shot and fisherman. He had also to have great tenacity and endurance, the conditions of travel being often such that only curiosity, the greatest human motive-power next to love and hunger, could enable him to support them. It follows that the successful collectors were very remarkable men, and their lives and characters well worth recording." And they are recorded well!

This fascinating book describes these collectors, their collections and their itineraries in chronological order in each of different areas of the globe in the order in which they were explored — the Mediterranean and Near East, northern Europe, Asia, the Antipodes, Africa, North America and finally South America. It is almost unfair to single out a few of these hunters for special mention, as, for instance, Forsyth who went disguised as an Oriental in China, Wilson who did not do so but always had a sedan chair toted as an essential for prestige even if dismantled, and Hove who found himself being presented to an Indian rajah following a night during which rats with no tonsorial skill chewed off much of his pomaded hair.

There are other assets in this book such as neat print except for two letter inversions on p. 155, several fine photographs of explorers and maps, a carefully prepared bibliography, a list of the illustrations, indices of collectors and of almost a thousand plants mentioned, and an epilogue evaluating the future of plant collecting.

"BIOLOGY OF ACETABULARIA" edited by Jean Brachet & Silvano Bonotto, xv & 300 pp., illus., Academic Press, New York, N. Y. 10003 & London. 1970. \$10.00.

This volume represents the proceedings of the First International Symposium on *Acetabularia* organized jointly by the Université Libre de Bruxelles and the Centre d'Étude de l'Énergie Nucléaire in Mol and held in both cities of Belgium, June 18--20, 1969. Exclu-

ding the printed introductory pages, the book is produced by a photo-offset process which permits more prompt publication. Even an useful index is included, although with the "F" references out of place. All the papers are in English which is often expressed awkwardly and too often misspelled, as, for instance, independence on p. xii, aging on p. 27, apparent on p. 147, attended on p. 289, etc. A careful proof-reading was obviously not done. Some diagrams are far from helpful; several electron micrographs in different articles are quite well reproduced and valuable as new material.

Besides an introduction and a concluding remarks paper by Brachet there are 16 papers that deal with the nucleo-cytoplasmic relationships in growth and differentiation, biochemistry, ultra-structures, circadian clocks, light and radiation effects, photosynthesis, and autonomy of mitochondria and of chloroplasts as carried on by the fascinating umbrella-shaped giant chlorophyte growing in shallow warm coastal waters.

This work will surely have appeal to almost all biologists, biology students and biology teachers on all levels.

"A MANUAL OF PLANT NAMES" by C. Chicheley Plowden, 260 pp., illus., Philosophical Library, New York, N. Y. 10016. 1970. \$10.00.

This book succeeds in its well known horticulturist-writer's aim of collating in handbook size a treasure-house of information for gardeners, horticulturists, botanists and plantmen.

After an introduction to the history of the naming of plants and to the nature of the Botanical Code, there are introductory explanations to each of the following: generic and specific names with translations from the Latin, common names of horticultural and other economic plants with botanical equivalents, botanical terms defined, illustrated flower and leaf gross structure, and the "plant system" with notes on families and genera of special importance or interest. At the end there is an index of botanical and common family names.

On p. 247 the Verbenaceae is limited to 65 genera and 750 species, when actually in its most restricted sense it contains 74 genera and about 3431 valid species and scientifically named sub-specific taxa. Tectona, a genus of considerable economic importance, is not mentioned. Clerodendrum is correctly spelled on this page, but not so on p. 41.

"PLANT PATHOLOGY" by George N. Agrios, xiv & 629 pp., illus., Academic Press, New York, N. Y. 10003 & London. 1969. \$14.

This is the best textbook in this field that I have perused: best because of its careful and readily comprehensible explanations of scientific principles involved in all of the host-parasite or pathogenic plant-environment situations, best because of many illustrations of high educational value.

The author's preface describes well the contents of this text: "The first part of the book deals with general considerations of disease, the disease cycle, parasitism and pathogenicity, and the variability in pathogens. This is followed by a presentation of the mechanisms by which pathogens cause disease and the mechanisms by which plants resist disease. Considerable space is devoted to a biochemical discussion of the effects of pathogen-produced enzymes, toxins, growth regulators, and polysaccharides on the structural organization and on the basic physiological processes of photosynthesis, translocation, and respiration, as well as to a biochemical discussion of the defense mechanisms of the plant. Finally, discussions are included on the genetics of host-parasite interaction, effects of environment on disease development and control.

"The second part of the book deals with the infectious diseases caused by fungi, bacteria, parasitic higher plants, viruses, and nematodes and with the noninfectious diseases caused by environmental factors. The diseases caused by each type of pathogen are discussed comprehensively as a group and are subsequently discussed individually in detail. Diagrams of cycles for each disease are included to help the student create visual images for the better and longer-lasting understanding of the disease."

Perhaps many interested readers, students, teachers and scholars from the broader fields of botany and biology are not aware of how common a phenomenon parasitism of cultivated crops is. "In North America, for example, some 8,000 species of fungi cause approximately 80,000 diseases, and at least 180 species of bacteria, more than 500 different viruses, and over 500 species of nematodes attack crops."

The print makes reading facile even though the letters in "haustorium" are jumbled on p. 591 but correctly given in the text and index.

Selected bibliographies accompany the chapters.

Glossary definitions should have been limited to such terms "as used in this text" because terms like "spicule", "ostiole", etc. have additional biological meanings.

"INSECT AND HOST PLANT", Proceedings of the 2nd International Symposium, edited by J. De Wilde & L. M. Schoonhoven, 340 pp., illus., North-Holland Publishing Co., Amsterdam & London. 1969. \$15.00.

This conference was held at Wageningen, Netherlands, 2--5 June 1969 on an invitational basis in order to review "knowledge of the factors leading to an interaction between two organisms which are so diverse as insects and plants" and so to find "more subtle methods than merely using insecticides" to control "insect pests in food crops". Besides the opening address by the editors, 28 valuable papers are presented by recognized research workers from all over the world in this separate reprinting from *ENTOMOLOGIA EXPERIMENTALIS ET APPLICATA*, vol. 12, pp. 471--810, 1969.

Most of the papers are in English; summaries are given in another language. Each author provides a bibliography, but lamentably there is no general index.

The modern work on the nature of the chemo-electro-physiological and behavioral mechanisms used by phytophagous insects to recognize secondary substances and the nutrients in their host plants is particularly well developed and needed.

This book will be important not only for entomologists, but also for ecologists, botanists, certain ethologists, certain physiologists and biology students.

The print is clear and easily readable. On p. 735 the specific epithet sativus is misspelled.

"PRINCIPLES OF SCIENTIFIC BOTANY" or Botany as an Inductive Science by Mathias Jacob Schleiden, translated by Edwin Lankester, facsimile of the London 1849 edition, xxxv, viii & 616 pp., illus., The Sources of Science, no. 40, Johnson Reprint Corporation, New York, N. Y. 10003. 1969. \$27.50.

This book has been and remains an important influential "land mark" in the development of botany. Therefore it is good, indeed, to have it available again for school, university and personal libraries, even if at a fantastically high price. It is an abbreviation of the important "Grundzüge der wissenschaftlichen Botanik".

The work is definitely enhanced by an analytical introduction by Dr. Jacob Lorch of the Hebrew University in Jerusalem. He gives biographic material concerning this brilliant and often offensively egotistical author, as well as appraisals of the famous flower embryo studies, of the botanical end of the cell theory, and of the epoch-making "Grundzüge" made so by "the novel emphasis, as well as the fluent and very readable language which exuded a truly contaminating enthusiasm for the scientia amabilis.....His profound influence on botanical research as well as on the teaching of botany is felt to this day, when studies of the cell enjoy a new peak of interest which was inaugurated by Schleiden, with rare insight, more than 120 years ago."

Unlike texts of today, the same illustrations are repeated for different illustrative needs.

"THE NATURE OF LIFE" -- Earth, Plants, Animals, Man and Their Effect on Each Other by Lorus & Margery Milne, 320 pp., illus., Chanticleer Press Edition, Crown Publishers, Inc., New York, N. Y. 10016. 1970. \$17.50.

What a beautiful, interesting and valuable book! It is particularly pertinent because of today's growing interest in the nature and preservation of our ecosphere. It is the work of two "seasoned" biologist-naturalists who have written often and well. It is embellished by 208 exquisite illustrations, 82 in full color, the work of many well known nature photographers including

the authors themselves.

After a description of our dynamic earth, its evolution and of its mobile diversified life, the authors give living portraits of the main biogeographical areas searching for historical patterns that have been building for at least 300 million years. So much material is presented about so many different living creatures without producing the feeling of cramming but needing the not quite complete index of plants and animals with over 1600 entries. The last chapter entitled "The Spread of the Cultured Primate" is an impressive appraisal of man's effect upon his environment.

There is no bibliography, probably because the book is directed to general readership and because if complete it would have to be immense.

The Chanticleer Press is to be congratulated upon producing this excellent work. Even so a few tiny errors slipped through, as, for instance, the misspelling of Epidendrum on p. 79 and the use of "most unique" on p. 167.

"READINGS IN BIOLOGICAL SCIENCE" edited by Irving William Knobloch, 2nd edition, ix & 491 pp., Appleton-Century-Crofts, Inc., New York, N. Y. 10016. 1967. \$3.95, paperback.

The intention of the editor to offer enrichment, more detailed explanations and inspirational reading to replace some stultifying laboratory exercises is admirable, but the goal is achieved with about only a half of the selections. Many are just "text book" or insignificant. The excerpts from the following authors particularly pleased this reviewer: Darwin, Percival, Iltis, Beadle, Dobzhansky, Becker, Hardin, and Hamburg.

Several words were carelessly misspelled in the text, as luciferin on p. 51, average on p. 69, photosynthesis on p. 87, known on p. 143, schistosomiasis on p. 210, experimental on p. 291, and Cretaceous on p. 436.

Many different journals and books were used as source material.

"ARBOLES EXOTICOS" - Los Arboles Cultivados en Gran Canaria I by Günther Kunkel, 242 pp., illus., Ediciones del Excmo. Cabildo Insular de Gran Canaria. 1969. 300 ptas.

This is a very attractive and valuable start to what is hoped will become a complete survey of the island. Herein 72 genera in 42 families have their cultivated species described with common names, etymology, geographic distribution, literature references and propagation notes added. On the facing page for each species there are beautiful and accurate drawings executed by the talented wife of the author.

What is called Citharexylum quadrangulare is better identified as C. spinosum.

"NATIVE AND NATURALIZED PLANTS OF NANTUCKET" by Frank C. MacKee-
ver, edited by Harry E. Ahles, xxviii & 132 pp., University
of Massachusetts Press, Amherst, Mass. 01003. 1968. \$6.50.

Nantucket island, off the Rhode Island coast, was to the author a vacation and a botanical paradise isle which he visited 19 times, collecting a herbarium there of 1,089 specimens with 610 species and subspecific units in 100 families, with 114 of them native and 196 introduced, and with several as new records.

The editor in his foreword writes: "With much research, he [MacKeever] also brought together the material presented by previous workers, correlating their nomenclature with that of the present day. At the time of his death, he had all but completed his work.....It is my hope that this catalogue, which represents a significant contribution to botanical science, may also prove a fitting memorial to a fine botanist." Through the efforts of both the author and the editor it certainly is!

This catalogue is enriched with interesting comments, copious cross references and a full index.

"AN INTRODUCTION TO PLANT DISEASES" by B. E. J. Wheeler, ix & 374 pp., illus., John Wiley & Sons, Inc., London, Sydney, Toronto & New York, N. Y. 10016. 1969. \$12.75.

This very carefully prepared text is planned for a beginning course in plant pathology by an author-teacher of considerable renown, especially in the British Isles. The chapters cover the following topics: concepts of plant pathology, damping-off and seedling blights, root and foot rots, wilts, downy and powdery mildews, rusts, smuts, blight, anthracnose, leaf spots and curl, witches' broom and club-root, galls, cankers and scab, mosaics and yellows, postharvest diseases, disease assessment, and disease control methods. The work is well illustrated, well explained and well documented with literature references.

This book will inevitably be compared with the new Agrios' text (and vice versa) produced in the United States. Each is highly meritorious, with the Agrios' text having greater emphasis on biological principles and having more attractive format and reading style.

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 21

April, 1971

No. 3

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
or \$8, at close of volume

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A LIST OF JAMAICAN SPECIES OF CYNANCHUM (ASCLEPIADACEAE)

William T. Stearn British Museum (Natural History)

Since its establishment by Linnaeus in the Species Plantarum 1:212 1753, Genera Plantarum, 5th ed. 101. 1754, the genus Cynanchum has been variously defined. Linnaeus included within it five species, of which two, i.e. C. acutum and the apparently conspecific C. monspeliacum, have been retained in Cynanchum by all subsequent authors; two, i.e. C. suberosum and C. hirtum, have been transferred to Gonolobus and one, i.e. C. erectum, to Marsdenia. Cynanchum acutum, a European species, can thus be reasonably accepted as the lectotype and was so designated by Britton and Brown, Illustr. Fl. N.U.S. 2nd ed, 3:36. 1913 and by Hitchcock and Green in Nom. Prop. Brit. Bot. 136. 1929. In 1941, when surveying the North American genera of Asclepiadaceae, Woodson in Ann. Missouri Bot. Gard. 28: 208-215. 1941 redefined Cynanchum so as to include in it many groups which on mostly rather subtle differences had hitherto been maintained as separate genera, among them Ampelamus, Decastelma, Mellichampia, Metalepis, Rouliniella, Tainionema and Tylodontia. The last general survey of the West Indian species of this group was by Schlechter in Urban's Symbolae Antillanae 1: 236-290. 1899. Woodson's view of generic delimitation here being now generally accepted, it seems desirable to publish a list of the Jamaican species to be included in volume 6 of Fawcett and Rendle's Flora of Jamaica.

1. CYNANCHUM JAMAICENSE (Griseb.) Woodson in Ann. Missouri Bot. Gard. 28:210. 1941.
Enslenia jamaicensis Griseb., Fl. Brit. W. Ind. Isl. 418. 1862.
Rouliniella jamaicensis (Griseb.) Rendle in J. Bot. (London) 74:340. 1936.
 Described from Jamaica (Wilson s.n)
2. CYNANCHUM HARRISII (Schlechter) Stearn, comb. nova
Metaltelma harrisii Schlechter in Urban, Symb. Ant. 1: 256. 1899.
 Described from Jamaica (St. Andrew, Harris 5491)
3. CYNANCHUM PRIORII (Rendle) Stearn, comb. nova
Metastelma priorii Rendle in J. Bot. (London) 74: 339. 1936.
 Described from Jamaica (St. Ann, Prior).

4. CYNANCHUM ALBIFLORUM (Griseb.) Stearn, comb. nova
Metastelma albiflorum Griseb., Fl. Brit. W. Ind.
Isl. 417. 1862; Schlechter in Urban, Symb. Ant.
5: 468. 1908.
Metastelma hartii Schlechter in Urban, Symb.
Ant. 1: 256. 1899.
Both described from Jamaica (M. albiflorum based
on March s.m., Hart 895).
5. CYNANCHUM RENDLEI Stearn, nomen novum
Metastelma jamaicensis Schlechter in Urban,
Symb. Ant. 5:469. 1908; non
Cynanchum jamaicense (Griseb.) Woodson. 1941.
Described from Jamaica (St. Andrew and Kingston,
Harris 8866). Renamed in honour of Dr. Alfred Barton
Rendle (1865-1938), from 1906 to 1930. Keeper of
the Department of Botany, British Museum (Natural
History), London, joint author with William Fawcett
(1851-1926) of the Flora of Jamaica.
6. CYNANCHUM FAWCETTII (Schlechter) Stearn, comb. nova
Metastelma fawcettii Schlechter in Urban, Symb.
Ant. 1: 260. 1899.
Described from : Jamaica (St. Andrew, Harris 7404).
7. CYNANCHUM LEPTOCLADUM (Dcne.) Jimenez in Rhodora
62: 238. 1960.
Vincetoxicum leptocladum Dcne. in DC., Prodr.
8:526. 1844.
Amphistelma leptocladon (Dcne.) Griseb., Fl.
Brit. W. Ind. Isl. 418. 1862.
Metastelma leptocladon (Dcne.) Schlechter in
Urban, Symb. Ant. 1:261. 1899.
Cynanchum sauvallei Alain in Mem. Soc. Cubana Hist.
Nat. 22:120. 1955.
V. leptocladum described from Haiti (Nectoux),
A. filiforme from Jamaica (Prior, McNab, March,
Wulfschlagel).
8. CYNANCHUM ATRORUBENS (Schlechter) Alain in Mem. Soc.
Cubana Hist. Nat. 22:120. 1955.
Metastelma atrorubens Schlechter in Urban, Symb.
Ant. 1:263. 1899.
Described from Jamaica (St. Andrew, Harris 6921).

RUMEX OF HAWAII

Otto & Isa Degener

In 1811 appeared the second edition of William Townsend Aiton's "Hortus Kewensis; or, A Catalogue of The Plants Cultivated in The Royal Botanic Garden at Kew." Aiton, as the title page mentions, was "GARDENER TO HIS MAJESTY." On page 323 he describes, as new, Rumex giganteus, calling it "Tall Dock." He adds that it was native "of the Sandwich Islands. Mr. David Nelson." Furthermore, the next line states that it had been introduced in "1796, by Archibald Menzies, Esq."

David Nelson was Captain James Cook's botanist, while Archibald Menzies was Captain George Vancouver's. Automatically, without much thought, we would have considered a Nelson sheet deposited at the British Museum (Natural History) as the lectotype for the species s.s. We maintain, however, that the lectotype should be a sheet at Kew labelled "R. giganteus Ait. H. Kew. Rumex 40 feet high. Climber, Sandwich Isles, A.M., C68." The initials evidently refer to Archibald Menzies. As Aiton was listing and describing the plants growing in the gardens of Kew, he evidently grew the giant Rumex from seed introduced by Menzies about fifteen years before the catalogue went to press.

According to Skottsberg in Acta Horti Gotob, 2:225. 1926, specimen C68 "has leaves with margin and veins pilose, and so is the stem."

In conclusion, after receiving bibliographic and herbarium aid from Messrs, Peter Green, Edgar Milne-Redhead, John F. Reed, Georg M. Schultze and William T. Stearn, we believe at least two main taxa of Rumex giganteus grew (and still survive) in the rainforest mauka of the Kealahakua area, Island of Hawaii, a rainforest that has retreated inland during the past 200 years' attack by Caucasian and Oriental animal and plant invaders:

1. R. giganteus Ait. var. giganteus. A somewhat pilose plant. Type: C68 in herb. British Museum. Though the endemic flora is being rapidly exterminated, we are gratified to have found a liana approaching the type. It is Degener's & L.W. Bryan 32,457. Kahuamo, South Kona. Hawaii. Rainforest at 3,250 feet. May 29, 1969.

2. R. giganteus Ait. var. nelsonii Deg. & Deg., var. nov. Planta glabra. Unlike the previous variety, this one is glabrous. The type we consider to be the specimen deposited in the British Museum under the legend "Rumex giganteus, 'Sandwich Islands, Dav. Nelson.'" During the past two years we have collected this variety, the less rare of the two, in the rainforest from Kulani around the southwestern slope of Mauna Loa to Hualalai. If the historical Nelson plant for any reason cannot be the type, the lectotype would be

"Degeners & Piccos 32,456. Mauna Loa Boys' School, Hawaii. Sprawling tangle in clearing at 5,700 feet. Aug. 10, 1968." A rooted sheet of this liana (renumbered 32,443 and harvested July 26, 1970.) was planted in the writers' garden at Volcano, Hawaii, next to R. skottsbergii, as described below. Degeners & Piccos 32,458 collected Aug. 15, 1970 "at 2,500 feet, Punaluu mauka, Kau, Hawaii.", is not particularly outstanding because it has a faint tendency to being glabrate; but because it completely fills with its scrambling, overlapping branches, to the exclusion of other plants, a small gulch. Cranwell, Selling & Skottsberg 3,108 is an Island of Hawaii specimen with typical inflorescence, but otherwise a bit strange. It is from the ancient, deeply eroded and somewhat isolated "Kohala Mts., Upper Hamakua ditch trail. 9/17/38."

It is disconcerting, as Skottsberg has indicated for the local taxa of the genus on pages 223-228 and elsewhere, that our species are not clear-cut Linnean ones. Depending on the limited information available to us, we recognize also:

3. R. giganteus var. nelsonii forma annectens Deg. & Deg. Frutex circa 12 dm. altus. This form maintains the same diffuse, red inflorescence; but approaches R. skottsbergii in its low, erect habit.

Type Locality: "Otto Degener, Isa Degener & L.W. Bryan 32,455. West side of Hualalai, Hawaii. Scrub vegetation at 5,000 feet. July 27, 1967." Type at N.Y., as are all our novelties unless extenuating circumstances make it impracticable to deposit them there. Local Range: Beside the type collection, Degeners & Amy Greenwell 32,454, from Hualalai, "At 7,000 feet; old aa flow. July 9, 1967," belongs here.

4. RUMEX SKOTTSBERGII Deg. & Deg. SKOTTSBERG DOCK; PAWALE

Rumex giganteus sensu Hillebr. Fl. Haw. Isl. 377. 1888. (In part.)
Rumex giganteus sensu Skottsberg in Acta Horti Gotob. 2:223. 1926.

(In part.) The novelty is named for Dr. Carl Skottsberg, who here gave results of his study of local Rumex taxa.

Rumex giganteus sensu Degener, Plants Haw. Nat. Park 152. 1930; ibid. 1945.

Rumex giganteus sensu Fagerlund & Mitchell in Nat. Hist. Bull. (Haw. Nat. Park) 9:35. 1944.

Rumex giganteus sensu Hubbard & Bender, Trailside Plants Haw. Nat. Park 4:7. 1950.

Rumex giganteus sensu Fosberg in Doty & Mueller-Dombois, Atlas Bioec. Stud. 187. 1966.

Not Rumex giganteus Ait. Hort. Kew. ed. 2:323. 1811. (Rainforest up to about 15 meter long lianas with loose, horizontal to drooping inflorescences brilliantly red but drying castaneous. This complex is represented by an important sheet - R. g. var. nelsonii - collected by David Nelson and deposited in the British Museum (Nat. Hist.) and by one - R. g. var. g. - annotated "Rumex 40 feet high - - -



Rumex giganteus var. nelsonii Deg. & Deg.
David Nelson's historic plant.
Courtesy British Museum (Nat. Hist.)

C68.")

Rumex skottsbergii sp. nov. Frutex erectus, 7 - 10 dm. altus; folia ampla elliptica; inflorescentia flavo-viridis. (We believe an illustration is more an "international language" than Latin and should be permitted to substitute for a Latin diagnosis.)

Erect 7 - 10 dm. tall entirely glabrous shrub with many stiffly erect slightly zigzag twiggy longitudinally grooved stems arising from compact rootstalk bearing thick yellowish taproots. Leaves pale green fading yellow: most blades 10 X 4.5 cm., oval with acute apex but toward inflorescence gradually smaller and more ovate- to obovate-elliptic with somewhat cuspidate apex, thick, entire or nearly so and never crisped, with acute to acuminate base; petioles slender, somewhat shorter than lower blades and often longer than upper blades; ocrea thin, castaneous. Flowers extremely numerous, yellowish green, imperfectly dioecious with staminate and pistillate flowers at times in same fascicle, subtended by minute persistent scarious ocreae: pedicels 3 - 5 mm. long, filiform except for thickened top, persistent in fruit; inflorescence stiffly erect, compact, enlarging in fruit to become usually broad-conical and 10 - 20 cm. wide. Pistillate flower: outer sepals concave, oval-cuneate to obovate, with obtuse apex, faintly nerved, almost 1.5 mm. long, spreading at anthesis; inner sepals longitudinally recurved to facilitate lateral extrusion of the longer stigmatic branches, ovate with subtruncate base and usually retuse apex, 3 mm. long and almost 2 mm. wide, erect at anthesis, with veins and especially midrib prominent. Ovary 1 mm. long, ellipsoid-trigonus with sharp angles, short-stipitate; styles filiform, each acutely widening into white-translucent broadly fan-shaped stigma irregularly twice and thrice fringed to form about 40 ultimate flat branches. Staminate flower: sepals concave, obovate with obtuse apex, faintly nerved, grading from about 1 mm. long for outermost to 2 mm. long for innermost, suberect; filaments filiform; anthers pale yellow, exserted, obovoid, 1.5 mm. long, emarginate at base and deeply narrowly cordate at apex; aborted ovary 0.5 mm. long, with spreading flat truncate stigmas each half as long. Fruit yellowish green ripening castaneous; outer sepals reflexed, marcescent, not enlarged; inner sepals erect to closely invest nutlet, 4 - 6 mm. long, undulate to somewhat erose-dentate, obtuse to retuse at apex, broadly cordate at base, conspicuously net-veined except for open margin, with midrib prominent without but sulcate within; nutlet shiny, ob-ovoid, deeply trigonous, 2.5 mm. long, obtuse to a minute truncate stalk at base, somewhat beaked.

Type Locality: Degeners & Piccos 32,453. On 1907 Lava Flow, Kau, Hawaii. On lava rubble at 1,600 feet. July 26, 1968. Type at NY, cotypes widely distributed.

Local Range: At present we know this species complex is native to Hawaii, where it is common on the ash and aa flows from about Kilau-ea and Kilauea Iki Craters through the aalii, ohia lehua and ukiuki pahoe-hoe flows of the Kau Desert up the Southwest Rift Zone of Mauna Loa and thence northward into Kona until stopped by forests. It grows from about 2,000 to 7,000 feet elevation. It is strictly a

pioneer, springing up like a weed in bulldozed aa lava. The roots of the seedling apparently rush during the rainy season to reach moist depths for the plant's establishment before advent of the dry season. This common erect xerophyte has been mistaken for the gigantic liana R. giganteus with loose, brilliantly red inflorescence first collected by Nelson, presumably mauka of Kealahou in the rain-forest. After growing the erect shrub (like Degener's & Piccos 32,453) and the liana (Deg. & Deg. 32,443, Degener's & Piccos 32,456) next to each other for several years at 3,800 feet elevation in our Volcano, Hawaii, garden and noting that both taxa retained their specific characters over several years, we confidently consider R. skottsbergii specifically distinct. In addition to the Island of Hawaii, we suspect this species in several inferior taxa, to be on Maui and Nihoa as explained below.

"Rumex of Hawaii" concentrates on the genus as it occurs on the "Big Island." We here add some of our observations of, and surmises about, Rumex on the smaller islands as well.

Few readers realize that the Hawaiian Archipelago is close to 2,000 miles long, extending from the northwestern Kure and Midway Islands via such reefs, shoals and islets as Hermes, Laysan and Necker to massive Maui and Hawaii. The northwestern islands, first formed, were once of considerable size and elevation, and have since been mostly peneplaned to ocean level. When the island primordia began forming on the ocean floor is debatable. But an indication of how old such islands may be is shown by the find of fossils of Miocene Age - roughly 25,000,000 years ago - in core samples from Midway. These islands were certainly covered with jungle vegetation - now gone - when high enough to form and intercept rainclouds. The southeastern islands are generally younger, still of considerable size and elevation, and clothed with endemics until present interference by man.

As the crow flies, the Island of Hawaii is less than thirty miles distant from the Island of Maui, separated by the 6,000 foot deep Alenuihaha Channel. The possibility that these two islands have ever been connected by a land bridge is extremely unlikely. Yet we find that on Maui occur at least two taxa resembling the R. giganteus and R. skottsbergii complexes. The former is more or less represented by two sheets, namely 1.) Forbes 1050M, "Keaenae [Keanae] Gap, Halehaku. Crater of Haleakala," East Maui, Aug. 3, 1919. It bears a typical diffuse inflorescence. The area, as we know personally, is a dense, rainy jungle. 2.) G.R. Ewart III & G.C. Munro 63. "W. Maui, Honokowai valley, Amalu branch, valley bottom, alt. 2500 ft. Dec. 21, 1928." This bears a typical diffuse inflorescence.

On the other hand, the members of the R. skottsbergii complex are 1.) C.N. Forbes 1067M. Crater of Haleakala, Maui. Aug. 6, 1919. It bears a compact, erect inflorescence. 2.) James Henrickson 3878. Haleakala Crater. In cindery soil, base of sliding sands. July 15, 1969. It has a compact inflorescence; but the plant is said to be a

seven foot high shrub, which is several feet taller than typical R. skottsbergii as we know it in and about Kilauea on the Island of Hawaii. It appears to have red flowers a feature, if true, being more typical of R. giganteus.

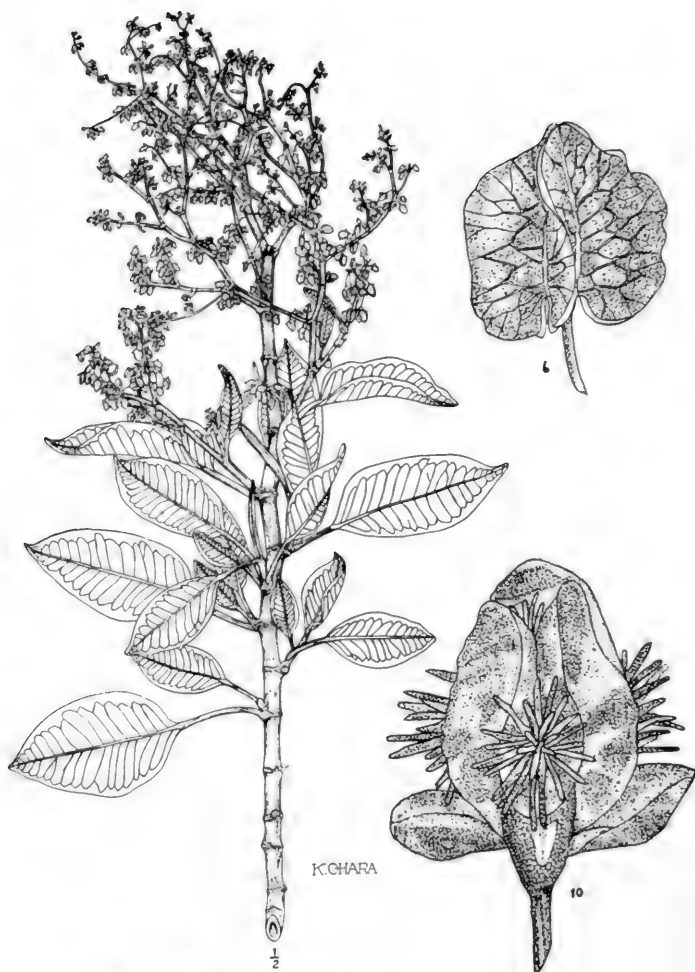
Even without special adaptations for flotation or for transport by animals, these native species of Rumex evidently traversed Alenuihaha Channel separating Hawaii and Maui, if they did not come from some third island such as Nihoa.

Maui, Kahoolawe, Lanai and Molokai in past ages were once a single island, before that time and after having been variously separated by narrow channels. These now have an average depth of not more than about 600 feet. Here Rumex need not have crossed any water to reach, for instance, from Maui to Molokai from which latter island Hillebrand reported "R. giganteus." He further states that the native name on Hawaii is pawale and on Molokai, uhauhako.

Uninhabited Nihoa, 400 to 500 miles west of Maui where some taxa of R. skottsbergii grow, has 895 foot high Miller's Peak and 852 foot high Tanager Peak. These two are the opposite rims of a large eroded crater. What plants clothed this high land in ages past? Was one of them a Rumex? In what we call the Marie C. Neal Herbarium of the Bernice Pauahi Museum are three sheets. They certainly belong, with their erect, compact, apparently green inflorescences, to the R. skottsbergii complex. Due to their condition, however, we are not prepared to state to which inferior taxon they may belong. They are 1.) E.L. Caum 71. Alt. 300. Height \pm 30 cm. "Shelves & holes in cliff n.w. near summit peak." June 18, 1923. 2.) E. Christophersen. "Nihoa, cliff under Miller's Peak, N. side, el. 250 - 300 meters." July 10, 1924. 3.) D. Yen 1015. "Devil's Slide, near Miller Peak. 600 ft. alt. May 1969."

It is intriguing to speculate whether the Nihoa Rumex is not a member of a very small relict flora, representing the genus which gradually disseminated eastward from the old, eroded islands to the new, now major, islands of the Hawaiian chain.

This is not all. We must yet consider Rumex on the islands of Oahu and Kauai. Oahu is separated from Molokai by the 2,300 foot deep and 30 mile wide Kaiwi Channel, and from Kauai by the 6,000 foot deep and 80 mile wide Kaieie Waho Channel. Formerly, Oahu consisted of two separate islands, the eastern one now dominated by the Koolau Range and the western one dominated by the Waianae Range. We know the Koolaus are more recent as well borings have shown that their lava flows overlie those of the Waianaes. No one has ever reported a native Rumex from the Koolaus, but along the precipitous sunny summit cliffs, ledges and slopes of the Waianaes grows the 5 - 8 cm. tall R. albescens Hillebr. It is an herb, rather than a shrub, with leaves crisped and erose-denticulate. Skottsberg, perhaps depending too much on herbarium material, had some difficulty in distinguishing this species from Hawaii plants; while our observations in the field



Rumex skottsbergii Deg. & Deg.

convince us of the correctness of Hillebrand's finding. Though not known from the Koolau Range of Oahu, this taxon, perhaps in several varieties and forms, appears on the Island of Kauai! It is significant that Skottsberg, mentioning Chromosome Numbers in Hawaiian Flowering Plants (Ark. f. Bot., Stockholm) 64. 1953, lists 36 as the 2N for a Kauai plant and 54 or 56 for plant 6,828 from Hawaii.

The more we become familiar with native taxa, the more do we realize how complicated the flora of the Hawaiian Islands is; *Rumex* is just one example. Although one of us has observed and collected the native taxa since 1922, we have solved just a few puzzles and drawn attention to many, many more. The new generation of botanists should concentrate on collecting more and better material, growing seeds under controlled conditions, making additional chromosome counts, and using newer and preciser methods unknown to workers of the past. The present fad to engage in a wealth of costly ecological experiments and studies without first untangling the taxonomy of our flora is placing the cart before the horse.

ADDITIONAL NOTES ON THE GENUS *PETITIA*. III

Harold N. Moldenke

PETITIA Jacq.

Additional & emended bibliography: Scop., *Introd. Hist. Nat.* 197. 1777; Schreb. in L., *Gen. Pl.*, ed. 8 [9], 1: 72. 1789; J. F. Gmel. in L., *Syst. Nat.*, ed. 13, pr. 1, 2: 245 & 943. 1789; Schreb. in L., *Gen. Pl.*, ed. 8 [9], 2: 863. 1791; Haenke in L., *Gen. Pl.*, ed. 8 [10], 1: 104 (1791) and 2: 803. 1791; J. F. Gmel. in L., *Syst. Nat.*, ed. 13, pr. 2, 2: 245 & 943. 1796; H.B.K., *Nov. Gen. & Sp. Pl.*, ed. folio, 2: 201 (1817) and ed. quart., 2: 248. 1818; Pers., *Sp. Pl.* 3: 358. 1819; Bischoff, *Handb. Bot. Term.* 1: Erk. Taf. 32, pl. 40, fig. 1718a. 1830; Bischoff, *Organ. Syst. Art. Regist.* 13. 1849; Schnitzl., *Icon. Fam. Nat. Reg. Veg.* 137. 1856; Barnhart, *Bull. Torrey Bot. Club* 29: 590. 1902; Metcalfe & Chalk, *Anat. Dicot.* 1035, 1037, & 1041. 1950; Kribs, *Comm. For. Woods*, ed. 1, 143, fig. 331 (1950) and ed. 2, 160—161, fig. 331. 1959; Hocking, *Excerpt. Bot. A.6:* 533. 1963; F. A. Barkley, *List Ord. Fam. Anthoph.* 76 & 196. 1965; Airy Shaw in Willis, *Dict. Flow. Pl.*, ed. 7, 856 & 1021. 1966; Moldenke, *Phytologia* 15: 236—240. 1967; Anon., *Biol. Abstr.* 48 (23): B.A.S.I.C. S.132. 1967; Moldenke, *Biol. Abstr.* 48: 10560. 1967; Dandy, *Reg. Veg.* 51: [Ind. Gen. Vasc. Pl.] 71 & 121. 1967; Uphof, *Dict. Econ. Pl.*, ed. 2, 398 & 541. 1968; Moldenke, *Résumé Suppl.* 17: 2. 1968; Hocking, *Excerpt. Bot. A.13:* 569—570. 1968; Kribs, *Comm. For. Woods*, ed. 3, 160—161, fig. 331. 1968; Stearn, *Humb. Bonpl. Kunth Trop. Am. Bot.* 16. 1968; Moldenke, *Biol. Abstr.* 50: 6948. 1969; Anon., *Torrey Bot. Club Ind. Am. Bot. Lit.* 3: 306 & 308. 1969; Moldenke, *Phytologia* 18: 509. 1969; A. L. Moldenke, *Phytologia* 18: 124—

125. 1969.

It should be noted here that the Humboldt, Bonpland, & Kunth references given in the above bibliography have been authenticated by Barnhart (1902) as to exact date of publication.

Airy Shaw (1966) places the genus Scleroön Benth. in the synonymy of Petitia, but it belongs, instead, in the synonymy of Citharexylum B. Juss.

PETITIA DOMINGENSIS Jacq.

Emended synonymy: Citharexylum melanocardium Sw. ex J. F.

Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 943. 1789.

Additional bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 245 & 943 (1789) and pr. 2, 2: 245 & 943. 1796; Bischoff, Handb. Bot. Term. 1: Erk. Taf. 32, pl. 40, fig. 1718a. 1830; Bischoff, Organ. Syst. Art. Regist. 13. 1849; Garman, Mycologia 7: 333. 1915; J. C. Arth., Mycologia 9: 62. 1917; Kribs, Comm. For. Woods, ed. 1, 143, fig. 331 (1950) and ed. 2, 160—161, fig. 331. 1959; Moldenke, Phytologia 15: 236—240. 1967; Kribs, Comm. For. Woods, ed. 3, 160—161, fig. 331. 1968; Moldenke, Résumé Suppl. 17: 2. 1968; Uphof, Dict. Econ. Pl., ed. 2, 398. 1968; Hocking, Excerpt. Bot. A.13: 570. 1968; A. L. Moldenke, Phytologia 18: 124—125. 1969.

Additional illustrations: Bischoff, Handb. Bot. Term. 1: pl. 40, fig. 1718a. 1830; Kribs, Comm. For. Woods, ed. 1, fig. 331 (1950), ed. 2, fig. 331 (1959), and ed. 3, fig. 331. 1968.

Uphof (1968) retains P. poeppigii Schau. as a distinct species (surely it deserves no more than varietal or form status!) and accredits it to "Scheuer". He records the vernacular variant name "capa blanco" for the species and tells us that its wood is light-brown to medium-brown, often variegated, with fine straight to somewhat wavy grain, medium to high luster, very hard, heavy, tough, and strong, it air-seasons rapidly, is easy to work, moderately resistant to dry-wood termites, fairly durable when in contact with the soil, and is recommended for furniture, cabinet-making, turned articles, novelty items, interior paneling, rollers in coffee-hulling mills, carts, posts, poles, piling, and props. Of what he calls P. poeppigii he says "Tree. West Indies. Wood strong, palisander [=Dalbergia]-colored; used for navy construction". Kribs (1968) records the additional vernacular names "fiddlewood", "guayo prieto", "roble guayo", "capa de sabanna", "bois d'sortie", "chene calle bassie", and "capa wood" — the last being its commercial name. He describes the wood in detail as "Color light yellowish brown with darker brown streaks and satiny luster; appears waxy. Odor and taste not distinct. Hard and heavy, sp. gr. 0.95 (air dry); weight, 59 lbs. per cu. ft. Grain straight to wavy or roey. Texture fine. Easily to turn and carve and takes a lustrous finish. Growth rings fairly distinct due to color zones and an increase in fiber density. Vessels barely visible without lens; numerous, evenly distributed to zonate, solitary and in radial groups of 2—4; tang. diam. 70u to 215u, av., 156u; lumina with tyloses; pits alternate, diam. 7u to 10u.

Fibers septate in part with simple pits. Parenchyma not distinct with lens; paratracheal scanty to vasicentric uniseriate. Rays barely visible without lens on the cross section; inconspicuous on the radial, heterogeneous type III, 1-3, mostly 2-3 cells wide and 10-20 cells high; lumina with very small crystals; ray-vessel pits oval to elongate, simple to half-bordered. Ripple marks absent. Gum ducts absent. Uses and source of supply furniture and cabinets, interior finish, millwork, flooring, tool and knife handles, rollers, posts, and turnery. West Indies."

Arthur (1917) describes the fungus, Olivea petitiae Arth., while Garman (1915) describes Septoria petitiae Garman from this species.

Stimson found the plant in pastures with extensive secondary growth and in dry scrub forests on mountainsides, describing it as a small tree, with red fruit in July, and called "capá blanco", growing to be 20 or 30 feet tall, with a stem diameter of 6 inches at breast height. Little says that the fruits are red. Gooding, Loveless, & Proctor (1965) tell us that Maycock recorded the species from the Barbados islands, but that there has been "no modern record of it" from there. Gillis 6843 was taken from plants that had escaped from cultivation.

Additional citations: FLORIDA: Dade Co.: Gillis 6843 (Ft-3011). BAHAMA ISLANDS: Grand Bahama: Gillis 7791 (Go). New Providence: J. Popenoe s.n. [Sept. 25, 1963] (Ft-2204, Ft). CUBA: Oriente: León 12045b (W-2289328). PUERTO RICO: E. L. Little 13080 (N); Stimson 3181 (N), 3279 (N); Woodbury & Stimson 1313 (W-2512419).

PETITIA DOMINGENSIS var. EKMANI Moldenke

Additional bibliography: Moldenke, *Phytologia* 15: 240. 1967.

Liogier describes this plant as a shrub or tree, 2-8 m. tall, the branches spreading, and the flowers greenish, growing in open places on rocks above cliffs and in coastal thickets on dogtooth limestone or "uncommon in thickets near seashore on dogtooth limestone", at altitudes of 10-20 m., flowering in February.

Additional citations: HISPANIOLA: Dominican Republic: Liogier 13759 (Ac, N), 13918 (N, Z).

PETITIA URBANII Ekm.

Additional bibliography: Hocking, *Excerpt. Bot. A.6*: 533. 1963; Moldenke, *Phytologia* 15: 240. 1967; Hocking, *Excerpt. Bot. A.13*: 570. 1968.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XIV

Harold N. Moldenke

CALLICARPA L.

Additional & amended bibliography: L., Syst. Nat., ed. 7, 87 & [227]. 1748; L., Gen. Pl., ed. 4, 415--416 & [446]. 1752; L., Syst. Nat., ed. 8, 94 & [231] (1756) and ed. 10, 2: 883, 885, 894, & 897. 1759; L., Gen. Pl., ed. 6, 55 & [585]. 1764; Retz., Obs. 5: 1--2. 1789; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 93--98. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 405--411 & 481. 1820; Blume, Bijdr. Fl. Nederl. Ind. 14: 817--819. 1826; Sieb. & Zucc., Fl. Jap. Fam. Nat. 2: 154--156. 1846; Hassk., Fl. Jav. Rar. 490--491. 1848; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 405 & 502--504. 1851; Van Houtte, Fl. des Serres 30 [ser. 2, 13]: 127--128, pl. 1359. 1858; W. B. Hemsl. in Godman & Salvin, Biol. Cent.-Am. Bot. 2: 538. 1882; W. B. Hemsl. in Thomson & Murray, Rep. Scient. Res. Voy. Challenger 3, Bot. 1: 110, 128b, & 176. 1885; K. Schum. & Hollr., Fl. Kaiser Wilh.-land 118--119. 1889; Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laub. Winterzust.] 269, pl. 14 [Tafel 10], fig. 8--10. 1895; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 4: 106--108 & xii (1917) and ed. 2, 1311--1312. 1927; J. M. Cowan, Rec. Bot. Surv. India 12: 29--31, 47, 48, 50, 65, & 68. 1929; Bor, Indian Forest Rec. 3: 152--195. 1942; Plourvies, Chem. Abstr. 45: 5244. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 40. 1953; Masam., Sci. Rep. Kanazawa Univ. 4 [Enum. Trachy. Jap. 7]: 46--47. 1955; G. Taylor, Ind. Kew. Suppl. 12: 27. 1959; Martin & Barkley, Seed Ident. Man. 115 & 195, pl. 132, fig. 261 & 792. 1961; Ohwi, Fl. Jap. 763--764 & 997--998. 1965; Carrick & al., Chem. Pharm. Bull. Tokyo 16: 2436--2441. 1968; Maiti, Bull. Bot. Surv. India 10: 111--112. 1968; Farnsworth, Blomster, Quimby, & Schermerhorn, Lynn Index 6: 261 & 262. 1969; K. C. Sahni, Indian Forest. 95: 333, 335, & 346. 1969; Chan & Teo, Chem. Pharm. Bull. Tokyo 17: 1284--1286. 1969; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1259, 1313, 1339, 1805, 1808, 1809, 1827, 1828, 1846, 1870, & 1875. 1970; Farnsworth, Pharmacog. Titles 5 (4): iii & items 3982, 4114, & 4115 (1970), 5 (9): ii & item 10008 (1970), and 5 (11): iii & item 14140. 1970; Willaman & Li, Lloydia Suppl. 33 (3a): 220. 1970; Moldenke, Phytologia 20: 482--499, 504, 505, 507, 508, 511, & 512 (1971) and 21: 32--55 & 101--114. 1971.

Wallich's work (1820) is sometimes inaccurately cited as "1: 394", that of Siebold & Zuccarini (1846) as "(1): 526. 1844", and that of Masamune (1955) as "6 (1): 46".

Cuscuta coryli, a parasitic flowering plant, often attacks members of the genus Callicarpa.

CALLICARPA ACUMINATA H.B.K.

Additional & emended bibliography: Hassk., Cat. Pl. Bot. Bogor. Alt. 136. 1844; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; J. F. Macbr., Field Mus. Publ. Bot. 13 (5): [Fl. Peru] 701. 1960; Moldenke, Phytologia 20: 487—489 (1971) and 21: 101, 108, & 114. 1971.

Additional citations: MEXICO: Hidalgo: H. E. Moore 3392 (Ca—919330, N). San Luis Potosí: J. Rzedowski 10689a (Mi). Yucatán: Arrington & al. s.n. [27.IX.1964] (Ip).

CALLICARPA AMERICANA L.

Additional & emended bibliography: L., Syst. Nat., ed. 10, 2: 894. 1759; Retz., Obs. 5: 2. 1789; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 93. 1818; Wall. in Roxb., Fl. Ind., ed. 1 Carey & Wall.], 1: 407 & 481. 1820; Spreng. in L., Syst. Veg., ed. 16, 1: 419. 1825; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 502. 1851; Martin & Barkley, Seed Ident. Man. 115 & 195, pl. 132, fig. 261 & 792. 1961; Farnsworth, Blomster, Quimby, & Schermerhorn, Lynn Index 6: 262. 1969; Blair & Epps, U. S. Forest Serv. Res. Paper SO.51: 1, [3], 9—11, 14, & 16—22. 1969; Blair & Epps, Biol. Abstr. 51: 11546. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1339, 1805, 1808, 1809, 1827, 1828, 1870, & 1875. 1970; Moldenke, Phytologia 20: 490—493 (1971) and 21: 35, 49, 50, & 102. 1971.

Emended illustrations: Martin & Barkley, Seed Ident. Man. 195, pl. 132, fig. 261 & 792. 1961; Blair & Epps, U. S. Forest Serv. Res. Paper SO.51: [3]. 1969.

Blair & Epps (1969) list this species as one of seven browse species in Louisiana and state that it is "abundant in pine-hardwood stands which have a relatively high canopy. It often dominates the lower cover in a forest clearing." Traverse describes the plant as a shrub, 2—3 m. tall, with a base trunk diameter of 4 cm., arching and sprawling, some weakly upright, the stems brittle, the bark "with small warts and tubercles", light-brown, the "berries" [drupes] green [when immature], growing in open woods above a backswamp, in dark-brown much-cracked silty soil, in the dominant complex of Fraxinus-Gleditsia-Liquidambar-Pinus taeda formation.

Additional citations: TEXAS: Chambers Co.: Traverse 823 (Go).

CALLICARPA AMERICANA var. LACTEA F. J. Muller

Additional bibliography: Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 1339 & 1809. 1970; Moldenke, Phytologia 20: 492—493. 1971.

CALLICARPA ANGUSTA Schau.

Additional & emended bibliography: Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 75. 1886; Maxim., Mém. Biol. 12: 506. 1886; Moldenke, Phytologia 20: 493 (1971) and 21: 108. 1971.

CALLICARPA ARBOREA Roxb.

Additional & emended bibliography: Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 405—406 & 481. 1820; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; K. Schum. & Hollr., Fl. Kaiser Wilh.-land 119. 1889; Prain, Journ. Asiat. Soc. Beng. 62: 50, 54, 55, & 74. 1893; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 521. 1900; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 107. 1917; J. M. Cowan, Rec. Bot. Surv. India 12: 29—31, 47, 48, 50, 65, & 68. 1929; Bor, Indian Forest Rec. 3: 152—195. 1942; K. C. Sahni, Indian Forest. 95: 333, 335, & 346. 1969; Moldenke, Phytologia 20: 493—495 (1971) and 21: 50, 103, & 108. 1971.

Prain (1893) records this species from Barren and Narcodam islands in the Andamans group, while Sahni (1969) records it from Nefa, India.

CALLICARPA CANDICANS (Burm. f.) Hochr.

Additional synonymy: Callicarpa euchlora Schau. ex K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522, nom. nud. 1900.

Additional & emended bibliography: Retz., Obs. 5: 1—2. 1789; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 94, 96, & 98. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 406—407 & 481. 1820; Blume, Bijdr. Fl. Nederl. Ind. 14: 817 & 819. 1826; Hassk., Cat. Pl. Bogor. Alt. 136. 1844; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 502. 1851; W. B. Hemsl. in Thomson & Murray, Rep. Scient. Res. Voy. Challenger 3, Bot. 1: 110 & 176. 1885; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 4: 107. 1917; E. D. Merr., Philip. Journ. Sci. 30: 426. 1926; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 1311. 1927; Moldenke, Phytologia 20: 495 & 499 (1971) and 21: 32, 36, 38, 47, 49, 50, 101—103, 108, & 114. 1971.

Bakhuizen van den Brink (1921) suggests that C. lanata Zipp., of Timor, may be conspecific with what he calls "C. cana", but I place it in the synonymy of C. pedunculata R. Br. Sprengel (1825) regarded C. tomentosa Willd. as a synonym of C. cana L., but I regard it as C. kochiana Mak., not C. nudiflora Hook. & Arn. as previously stated.

Schumann & Lauterbach (1900) aver that C. candicans "ist im Südasien verbreitet bis zu den Philippinen und Australien. — Burkill vermuthet, das C. euchlora Schauer mit ihr zusammenfällt." Probably this binomial is a lapsus calami for C. erio-clona Schau., but since it is here first published as a possible synonym of C. candicans I am so regarding it — at least until I succeed in locating the original Burkill reference.

The R. Parkinson s.n. [1901] and C. T. White 8981, distributed as C. candicans, are actually C. pedunculata R. Br.

CALLICARPA CANDICANS var. SUMATRANA (Miq.) Moldenke

Additional bibliography: Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 4: 107 (1917) and ed. 2, 1311. 1927; Moldenke, Phytologia 21:

32, 38, & 108. 1971.

This plant has been found growing in thickets or open places, with immature fruit in February.

CALLICARPA DICHOTOMA (Lour.) K. Koch

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 97. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 410—411 & 481. 1820; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; Van Houtte, Fl. des Serres 30 [ser. 2, 13]: 127—128, pl. 1359. 1858; Regel, Gartenfl. 9: 56. 1860; Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] 269, pl. 14 [Tafel 10], fig. 9. 1895; Ohwi, Fl. Jap. 763—764, 997, & 998. 1965; Farnsworth, Blomster, Quimby, & Schermerhorn, Lynn Index 6: 262. 1969; Moldenke, Phytologia 20: 491 (1971) and 21: 34—37, 42, 46, 49, 103, & 108. 1971.

Emended illustrations: Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 14 [Tafel 10], fig. 9. 1895.

The "C. purpurea" illustrated in Van Houtte, Fl. des Serres 30 [ser. 2, 13]: 127 & 128, pl. 1359 (1858), Lem. & Verschaf., Illust. Hort. 6: pl. 202 (1859), and Regel, Gartenfl. 9: 56 (1860) and often cited for C. dichotoma, is actually C. rubella Lindl.

The Togasi 1667, distributed as typical C. dichotoma, is actually the type collection of f. albifructa Moldenke.

CALLICARPA ELEGANS Hayek

Additional bibliography: Moldenke, Phytologia 21: 36. 1971.

The Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49011], distributed and previously cited by me as C. elegans, actually proves to be C. phanerophlebia Merr.

CALLICARPA ERIOCLONA Schau.

Emended synonymy: Callicarpa repanda K. Schum. & Warb. apud K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522. 1900.

Additional bibliography: Moldenke, Phytologia 20: 495 (1971) and 21: 36—37, 50, & 103. 1971.

It is very probable that the C. euchlora Schau. of Schumann & Lauterbach (1900) is only a misspelling of C. erioclona Schau.

CALLICARPA ERIOCLONA var. PAUCINERVIA (Merr.) Moldenke

Additional bibliography: Moldenke, Phytologia 21: 36—37. 1971.

Koidzumi (1918) avers that this taxon is remotely related to C. nishimurae Koidz.

CALLICARPA FERRUGINEA Sw.

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 95. 1818; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; Moldenke, Phy-

tologia 21: 37. 1971.

CALLICARPA FORMOSANA Rolfe

Additional & emended bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 14: 452. 1919; Hill & Salisb., Ind. Kew. Suppl. 10: 38. 1947; Willaman & Li, Lloydia Suppl. 33 (3a): 220. 1970; Moldenke, Phytologia 21: 36--39, 49, 101, & 102. 1971.

Merrill (1919) states that this species and C. obtusifolia Merr. are "manifestly" related, the latter differing by its elliptic to oblong-elliptic, usually rounded or obtuse, never acuminate leaf-blades. Chang (1951) reduces C. formosana Rolfe and C. aspera Hand.-Mazz. to synonymy under C. pedunculata R. Br., thus following the disposition of Bakhuizen van den Brink (1921).

CALLICARPA FORMOSANA var. CHINENSIS P'ei

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 271, 273, 278, 282--283, & 311, fig. 1 & 2. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Phytologia 21: 38. 1971.

Illustrations: H.-T. Chang, Act. Phytotax. Sin. 1: 273, fig. 1 & 2. 1951.

CALLICARPA HETEROTRICHA Merr.

Bibliography: E. D. Merr., Journ. Arnold Arb. 23: 192--193. 1942; R. J. Salisb., Ind. Kew. Suppl. 11: 40. 1953.

Merrill (1942) describes this taxon as follows: "Arbor 7--8 m. alta, ramulis ultimis 4--5 mm. diametro, densissime implicate-pubescentibus, pilis brevioribus numerosissimis substellatis, paucioribus intermixtis elongatis, depauperato-plumosis, subflaccidis, ad 3 mm. longis, indumento subferrugineo; foliis chartaceis, integris, obovatis vel oblongo-obovatis, acutis vel breviter acuminatis, basi acutis vel leviter decurrenti-acuminatis, 15--20 cm. longis, 6.5--10 cm. latis, supra olivaceis, ad costam nervosque dense pubescentibus, indumento ut in ramulis junioribus, parenchymate pilis sparsis brevibus stellatis vel depauperato-plumosis insperso, subtus pallidioribus sed haud albidis, ad costam nervosque densissime, in parenchymate manifeste sed haud dense stellato-pubescentibus, pilis superficiem haud occultantibus; nervis primariis utrinque 9--11, utrinque perspicuis, subtus elevatis, curvatis, ad marginem arcuato-anastomosantibus, reticulis primariis subparallelis; petiolo 1.5--2.5 cm. longo, indumento ut in ramulis junioribus; inflorescentiis multifloris, cymosis, pedunculatis, 8--12 cm. longis dense villosis, pilis stellatis et depauperato plumosis intermixtis; calycibus obovoideis, subtruncatis vel obscurissime 5-dentatis, extus dense pallide pubescentibus, circiter 1 mm. longis; corolla 3 mm. longa, sursum ampliata, tubo 2 mm. longo, lobis 4, suborbiculari-obovatis, late rotundatis, 1 mm. longis; staminibus 4, filamentis gracilibus, glabris, longe exsertis, 6 mm. longis; antheris ellipsoideis, 1 mm. longis; ovario globoso, glabro, stylo quam filamentis paullo longiore."

The type of the species was collected by Paul Alfred Pételot (no. 2608) in humid forests, at an altitude of about 600 m., on

Mount Bavi, Sontoy Province, Tonkin, Indochina, on July 2, 1940, and is deposited in the herbarium of the Arnold Arboretum at Jamaica Plain, Massachusetts. Merrill (1942) comments that "In Dr. Dop's key this falls with Callicarpa arborea Roxb. as interpreted by him, yet it differs from Roxburgh's species in so many striking characters, and for that matter all other Chinese and Indo-Malaysian species known to me, that I am constrained to describe it as new. The very dense indumentum on the branchlets, parts of the inflorescences, petioles, and on the midribs and lateral nerves on both surfaces of the leaves is made up of short crowded stellate hairs and much longer subplumose ones, the latter often 3 mm. in length, and usually with very few, short, lateral branchlets, these lateral branchlets scarcely stellate in arrangement. The shorter stellate hairs on the parenchyma on the lower surface by no means conceal the latter, the more or less scattered stellate hairs on other than the midrib and lateral nerves scarcely touching each other."

CALLICARPA JAPONICA Thunb.

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 96 & 97. 1818; Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] 269, pl. 14 [Tafel 10], fig. 10. 1895; E. D. Merr., Philip. Journ. Sci. 30: 426. 1926; Pluvier, Chem. Abstr. 45: 5244. 1951; Ohwi, Fl. Jap. 763--764, 997, & 998. 1965; Farnsworth, Blomster, Quimby, & Schermerhorn, Lynn Index 6: 262 & 263. 1969; Moldenke, Phytologia 20: 491 & 495--497 (1971) and 21: 33--35, 40--50, 101--104, & 106. 1971.

Emended illustrations: Shirasawa, Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 14 [Tafel 10], fig. 10. 1895.

Pluvier (1950) reports the presence of a fatty oil, a reducing sugar, and pectin in the fruit of this species.

The Lindquist s.n. [25/9/1959], distributed as typical C. japonica, is actually better placed as var. angustata Rehd.

Additional citations: JAPAN: Honshu: Jimbo s.n. [6/11/1927] (Go); Kobayashi 16253 (Go), 16483 (Go).

CALLICARPA JAPONICA var. ANGUSTATA Rehd.

Additional bibliography: Ohwi, Fl. Jap. 764 & 997. 1965; Moldenke, Phytologia 21: 33, 35, 42--44, 47, 48, 101, 103, & 113. 1971.

Additional citations: JAPAN: Honshu: Lindquist s.n. [25/9/1959] (Go).

CALLICARPA KOCHIANA Mak.

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 93 & 95. 1818; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Ohwi, Fl. Jap. 764 & 998. 1965; Moldenke, Phytologia 21: 32, 35, 42, 46--47, 50, & 103. 1971.

The Kobayashi 15903, distributed as C. kochiana, is actually C. mollis Sieb. & Zucc.

CALLICARPA LONGIFOLIA Lam.

Additional & emended bibliography: Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; W. B. Hemsl. in Thomson & Murray, Rep. Scient. Res. Voy. Challenger 3, Bot. 1: 110. 1885; K. Schum. & Hollr., Fl. Kaiser Wilh.-land 119. 1889; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522. 1900; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 107--108 (1917) and ed. 2, 1311--1312. 1927; Chan & Teo, Chem. Pharm. Bull. Tokyo 17: 1284--1286. 1969; Farnsworth, Pharmacog. Titles 5 (4): iii & item 4114. 1970; Moldenke, Phytologia 21: 101--114. 1971.

Blume (1826) describes the following two unnamed varieties: "Variet a. foliis longiter acuminatis, serraturis distinctioribus, cymis laxis petiolo longioribus. Crescit in terris argilloso-calcareis. Variet b. foliis minute serrulatis glabriusculis. Crescit in fruticetis montanis Seribu circa Rompieu." This reference is sometimes inaccurately cited as "p. 808" instead of p. 818. An additional recorded vernacular name for the species is "kajoe si marsioe-sioe".

The Wang 35683, distributed as typical C. longifolia, appears to be f. floccosa Schau. instead.

Additional citations: GREATER SUNDA ISLANDS: Sumatra: Boeea 10864 (N).

CALLICARPA LONGIFOLIA f. FLOCCOSA Schau.

Emended synonymy: Callicarpa oblongifolia Hassk., Pl. Jav. Rar. 490. 1848.

Additional bibliography: Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825; Hassk., Pl. Jav. Rar. 490--491. 1848; Heyne, Nutt. Plant. Nederl. Ind., ed. 2, 1311--1312. 1927; Moldenke, Phytologia 21: 101--104, 106--109, & 112--114. 1971.

Recent collectors have found this plant growing in shrub thickets, secondary scrub, open bush country, often in red soil, on level land or strand, on slopes of grassy hillsides, along trails, near rivers, in the half-shade of rubber plantations, and at the edge of forests or thickets, at altitudes from sealevel to 1400 meters, flowering from October to August and fruiting from November to September. Thaworn refers to it as "scattered in evergreen jungles" in Thailand, while Phloenchit also avers that it is "not common in evergreen jungles" in that land. The Clemenses tell us that it is a "common shrub in forests or thickets" in Sarawak. On Anambas Island it is said by Henderson to be a common shrub or small tree. Main found it "scattered in forests" in Dutch New Guinea.

The corollas are described as "blue" on Goklin 788 and on Hansen & Smitinand 12028, "violet" on Larsen, Smitinand, & Warncke 484 & 799 and Villamil 217, "lavender" on Clemens & Clemens 21090 and Yates 1604, "purple" on Phloenchit 475, Thaworn 282, and Yates 1486, "light-purple" on Phloenchit 498, "pale-mauve" on Purseglove P.5167, "pink" on Chun & Tso 43543, Herb. Philip. Bur. Sci. 44326, and Nur 18835, "purplish-white" on North Borneo Forest.

Dept. A.2248, "yellow" on Arsat 1158, "green" on North Borneo Forest. Dept. A.574, "light-green" on North Borneo Forest. Dept. A.658, "whitish" on H. H. Bartlett 8603, "white tinged with lavender" on Yates 653, and "white" on Clemens & Clemens 21785, Hoogland 3653, H. G. Keith 1166, Kornassi 773, Krukoff 4035, North Borneo Forest. Dept. A.1558 & A.2010, and Pleyte 667.

The Sumatran specimens are in general more hairy than those from most other localities, with the pubescence less distinctly stellate. A wood collection accompanies H. H. Bartlett 6936 at the University of Michigan and R. S. Williams 2116 at the New York Botanical Garden. The leaves are insect-galled on Bakhuizen van den Brink 1903, while the fruits are galled on the same collector's no. 186. Bunnemeijer 3783 has very tomentose stems and bears a striking likeness to the genus Geunsia. Lam 2049 is placed here tentatively, since it comprises only unattached fruit.

The C. lanceolaria ascribed to "Hort." belongs in the synonymy of typical C. longifolia Lam. H. J. Lam (1914, 1919) includes C. albida Blume in the synonymy of his C. cana var. sumatrana (Miq.) H. J. Lam, a taxon now known as C. candicans var. sumatrana (Miq.) Moldenke. Backer & Bakhuizen van den Brink (1965), however, regard C. albida Blume as a valid species, with C. blumei Zoll. & Moritzi and "C. longifolia Auct. non Lamk." as synonyms. From this supposed synonymy and from their description it would appear that they are adopting this name for both what I regard as typical C. longifolia Lam. and its f. floccosa Schau. Their composite description reads as follows: "Wild-growing. Drupe white; cymes on 1/2 — 1 1/4 cm long peduncles, stellate-hairy, 3—7 cm across; calyx shortly dentate, glabrous or stellate-hairy, 1 1/4 — 1 3/4 mm high; corolla lilac, 2 1/2 — 3 mm high, shortly lobed; lobes rounded, outside glabrous or stellate-hairy; stamens lilac, 3—5 mm; style 4—7 mm. Young branches densely to thinly stellate-hairy; leaves oblong-lanceolate, acuminate, acute, finely serrate-dentate, gland-dotted beneath or sometimes on both surfaces, when adult thinly stellate-hairy or glabrous on the upper surface (often with the exception of the large nerves), stellate-hairy or glabrous on the lower surface, 7—18 cm by 2 1/2 — 6 1/2 cm; petiole 3/4 — 2 cm. Shrub or small tree. 1.50—6.00; I—XII; W.C.E., Mad.; 1—1700; brushwood, light forest, village-groves. Variable! (C. blumei Z. & M., — C. longifolia Auct. non Lamk.)."

Singh tells us that the plant is native to eastern Bengal and the Khasi Hills. Rao & Rabha (1966) record it from Assam, while Deb, Sengupta, & Malick (1968) found it in Bhutan, citing Sengupta 896.

Chang (1951) maintains both C. longifolia f. floccosa and var. lanceolaria as valid taxa. For the former he cites nos. 28677, 66799, & 68796 and for the latter nos. 100, 3282, 27118, 33354, 36332, 62267, 66029, & 71071 of collectors and/or herbaria whose

names, unfortunately, he gives only in Chinese characters.

Common and vernacular names recorded for C. longifolia f. floccosa are "bagiha", "balah balah", "betoe-betoe", "betoe-betoe balab", "common callicarpa", "dotdrot", "kajoe bebetik", "kajoe sioe-sioe", "kapasan", "katoempang soend", "ki katoempang tanar", "leloya", "marbasi", "mumuni", "nasi-nasi", "paroe", "saring nudat", "sasad", "si marsioe-sioe", and "sioe-sioe".

Roxburgh (1820) describes his C. lanceolaria as "Shrubby, hairy. Leaves lanceolar, serrulate, acuminate. Panicles axillary, short-peduncled, sub-globular. Berries white. H. Koamoora. A pretty, shrubby species, with narrower leaves than any of the other species I have yet met in India, they taper most toward the base, are nearly smooth on the upper surface, but very hoary underneath; as are all the other tender parts. Flowers numerous, minute, purple. A native of the forests of Silhet, where it is in flower most part of the year." He describes "C. longifolia Linn. sp. pl. ed. Willd. i. 621", on the other hand, as "Shrubby with erect weak branches. Leaves rather long-petioled, broad-lanceolate, serrulate, smooth above, downy underneath. Panicles axillary, dichotomous, length of the pedicels. Berries white. A native of Prince of Wales Island, where it blossoms in June, July and August." It would appear from his statement that the leaf-blades are "downy underneath" here also, that his plant was also f. floccosa rather than the typical C. longifolia Lam., although I would have expected C. pedunculata R. Br. at that locality. The specimen on which this record is based should be re-examined. Watt (1889) claims that what he calls C. longifolia var. lanceolaria is native to eastern Bengal, the Khasi Hills, Chittagong, and Burma.

The statement by Benthham & Mueller (1870) that the C. longifolia of Australia has its "corolla densely pubescent" causes me to wonder if f. floccosa may not also be involved here, although the statement in the same sentence that the leaves are "green on both sides" points to the typical form and I have thus far seen only specimens of the typical form from that continent.

Bakhuizen van den Brink (1921) describes this form as "Forma ♀ floccosa Schau. in DC. Prod. Syst. Nat. XI (1847) p. 645. — A stout shrub or small tree; branchlets, cymes, and petioles densely floccose-hairy; leaves oblong or broadly lanceolate, distinctly serrulate-denticulate, upper side sparsely stellate-hairy when adult, or glabrescent, except on the nerves, lower side rather densely floccose; cymes stout, globose, usually rather short-petioled; calyx densely and floccosely stellate-hairy; corolla purple or rose, densely woolly outside."

The Clemens & Clemens 3029 & 21090, Krukoff 4053, Mondi 23, G. E. Perry 5228, Toroes 164, C. Wang 35683, and R. S. Williams 2116, cited below, were previously regarded by me as representing typical C. longifolia and were so annotated by me in some herbaria. I feel now, however, that they are better placed in f. floccosa. The Elmer 20102 & 20402, cited by me under typical C. longifolia,

actually show the lower surface of the younger leaf-blades somewhat floccose, but the mature leaves seem to be glabrate beneath, so I am retaining these collections under the typical form of the species. Elmer 15336 and Lei 1114 also seem to exhibit intermediate characters, some specimens more closely approaching the typical form, while others approach *f. floccosa*.

The Hamel & Toroes 1165, Hollrung 817, Hoogland 3653, Native Collector 273, and D. D. Wood 785, cited below, are placed here tentatively. Some specimens of these collections are also cited by me under typical *C. longifolia*. These specimens were mostly annotated by me a considerable number of years ago, before my present concepts of the delimitation of these taxa has crystallized. They need to be re-examined.

H. J. Lam (1924) cites Schlechter 13818 & 16453 from Northeastern New Guinea and Peckel 62 from New Ireland. The second of the Schlechter collections, however, is cited by me as typical *C. longifolia*.

Material of *C. longifolia f. floccosa* has been misidentified and distributed in herbaria under the names *C. angusta* Schau., *C. attenuatifolia* Elm., *C. attenuifolia* Elm., *C. longifolia* Lam., *C. longifolia* var. *subglabra* Schau., and *C. rubella* Lindl.

In all, 408 herbarium specimens and 4 mounted photographs of *C. longifolia f. floccosa* have been examined by me.

Citations: CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 43543 (N); F. C. How 72820 (Bi); Lei 1141, in part (Bi, Bz--18043); Li-ang 64465 (N), 66542 (N); F. A. McClure 3195 [Herb. Canton Chr. Coll. 9743] (Ca--248685, Ca--366339); C. Wang 35399 (N, W--1670546), 35683 (Go, N), 36336 (N, W--1670667). THAILAND: Mrs. D. J. Collins 2365 (W--1701690); Hansen & Smitinand 12028 (Cp, Rf); Larsen, Smitinand, & Warncke 484 (Ac, Rf), 799 (Ac, Rf); Phloanchit 475 [Herb. Roy. Forest. Dept. 8985] (Z), 498 [Herb. Roy. Forest. Dept. 10023] (Ss); Thaworn 282 [Herb. Roy. Forest. Dept. 12359] (Sm). INDOCHINA: Annam: Clemens & Clemens 3029 (Ca--340455, Gg--156760, N), 3481 (Ca--340208). Cochinchina: Poilane 40816 (B). State undetermined: G. E. Perry 5228 [Pulo Condot] (N, S). MALAYA: Johore: Herb. Hort. Bot. Bogor. 13074 (Bz); Herb. Hort. Bot. Singap. s.n. [Aug. 1938] (Bz--72763); Holtum 9237 (Bz--72768), 10924 (Bz--72769). Kelantan: M. R. Henderson 19633 (Bz--72767, Ca--342714), Malacca: Griffith s.n. [Malacca] (Bz--18033). Pahang: Kiah bin Hadji & Strugnell 23959 (N); Nur 11102 (Bz--18037), 18835 (Bz--72766), 32651 (Ca--3259). Perak: Spare 34553 (Bz--72764). MALAYAN ISLANDS: Palau Tioman: Nur 18835 (Ca--318639). PHILIPPINE ISLANDS: Catanduanes: M. Ramos s.n. [Herb. Philip. Bur. Sci. 30328] (N, N, W--1294193). Luzon: Fénix s.n. [Herb. Philip. Bur. Sci. 28048] (W--1375173); Ramos & Edayo s.n. [Herb. Philip. Bur. Sci. 29116] (W--1376038), s.n. [Herb. Philip. Bur. Sci. 33905] (W--1263543).

Mindanao: Elmer 13536, in part (Bz—17942); E. D. Merrill 8057 (Bz—17941, W—901898); R. S. Williams 2116 (It, N, W—707821).
 Tawitawi: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 44061] (Ca—257637), s.n. [Herb. Philip. Bur. Sci. 44064] (N), s.n. [Herb. Philip. Bur. Sci. 44326] (Ca—257636, N). GREATER SUNDA ISLANDS:
 Anambas: M. R. Henderson 20491 (Ca). Banka: Amand s.n. (Ut—49888, Ut—49889); Anta s.n. [Kostermans 1167-1164] (Bz—73013); Berkhout 300 (Bz—17995), 506 (Bz—17992, Bz—17993); Bünnemeijer 1521 (Bz—18000), 1884 (Bz—18001), 2357 (Bz—18052), 2390 (Bz—17999, Bz—25470); Kobus s.n. (Bz—17994); Teijsmann 3254 H.B. (Bz—17996), s.n. [Muntak] (Bz—17997). Billiton: Teijsmann s.n. [Billiton] (Bz—18006); Vordermann s.n. [Billiton] (Bz—18005).
 Bintan: Bünnemeijer 6214 (Bz—18016), 6498 (Bz—18021), 6514 (Bz—18020). Borneo: Bianehi 48 (Bz—17704); Dunselman 161 (Bz—17699); Endert 3254 (Bz—72706); Enoh 267 (Bz—72988), 398 (Bz—72987); H. Hallier B.309 (Bz—18046); Ilaim 1722 (Bz—72986); Jaheri 1417 (Bz—17696); Mondi 23 (Bz—17700, Bz—25472, N, Ut—34060a); Polak 659 (Bz—72989); Rutten 263 (Ut—22677), 459 (Bz—17698, Ut—22675), 762 (Ut—41061); Winkler 2142 (Bz—17707).
 Celebes: Bünnemeijer 10643 (Bz—17950), 11014 (Bz—17951), 11707 (Bz—17952), 12580 (Bz—17949); Kjellberg 397 (Bz—17944), 725 (Bz—17943); Koorders 19486b [3360] (Bz—17953, Bz—25473), 19489b [2952] (Bz—17954); Rachmat 624 (Bz—17945); J. G. F. Riedel s.n. [Gprontalo] (Bz—17947, Bz—17948). Java: Backer 57 (Bz—17842), 940 (Bz—17769), 5890 (Bz—17773), 9099 (Bz—17770), 13935 (Bz—17825), 17127 (Bz—17738), 18454 (Bz—17859, Bz—17860), 21049 (Bz—17808), 22504 (Bz—17743), 22746 (Bz—17742), 30418 (Bz—17871); Bakhuizen van den Brink 186 (Bz—17763, Ut—24877a), 807 (Bz—17761), 901 (Bz—17778, Bz—17779), 1493 (Bz—17758), 1734 (Bz—17757, Ut—80687), 1877 (Bz—17762, Ut—24879a), 1903 (Bz—17759, Bz—17760), 4662 (Bz—17777), 4814 [563] (Bz—17790), 7210 (Bz—17730); Beumée 2320 (Bz—17856), 2433 (Bz—17872), 2716 (Bz—17873), 3820 (Bz—17855), 5572 (Bz—17854), A.303 (Bz—17787); Blume s.n. [Java] (N, N); Buwalda 7528 (Bz—72898); Forbes 408 (Bz—17867, Bz—17868); Garret & Burck 36 (Bz—17832); Gebruik 81 (Ca—792214); H. Hallier 81 (Ca—918388), 270 (Bz—17747, Bz—17748), s.n. [28.VIII.1896] (Bz—17740, Bz—17741); Herb. Bogoriense 17804 (Bz), 17866 (Bz); Karta 392 (Bz—17917); Koens s.n. [Mei 1912] (Bz—17874); Kollman s.n. [Java, 1838] (M, M); Koorders 9704b [2225f] (Bz—17878, Ut—80240), 22108b [109*] (Bz—17901, Bz—17902), 22985b [50*] (Bz—17881, Bz—25474), 23130b [3033*] (Bz—17877), 26857 [312*] (Bz—17899, Bz—17900), 29460b [506*] (Bz—17879, Bz—17880), 30239b (Ut—53167), 30750b [761*] (Bz—17888), 31279b [1543*] (Bz—17889, Bz—17890), 44036b [32*] (Bz—17891, Bz—17892); Kuntze s.n.

[1875] (N); Lörzing 381 (Bz—17850); Mousset 1048 (Bz—17875); Saimoendt 20 (Bz—17727, Ca—308072); Scheffer s.n. [29/5/1871] (Bz—17785), s.n. [3/10/71] (Bz—17783), s.n. [10/10/1871] (Bz—17801), s.n. [23/6/1872] (Bz—17803), s.n. (Bz—17802); Soegandiredja 36 (Bz—17796, Bz—17797), 285 (Bz—17792, Bz—17793); Teijsmann 40 (Bz—17826, Bz—17827); Thorenaar 171 (Bz—17861, Bz—17862), 354 (Bz—17863, Bz—17864); Van Steenis 415 (Bz—18047), 5674 (Bz—17844); Vordermann "YY" (Bz—17852); Winckel 8 (Ut—58388), 181 (Ut—53166), 181b (Bz—17764), 462b (Bz—17791), 727b (Bz—17775), 864b (Bz—17765, Bz—17766), 872b (Bz—17767, Bz—17768), 1636b (Bz—17788), s.n. [9 Aug. '17] (Bz—18040), s.n. [20/1/1918] (Ut—53169). Kambangan: Collector Indig. 116 (Ut—21052). Lingga: Bünnemeijer 6772 (Bz—18011). Oedjan: Bünnemeijer 6454 (Bz—18017). Pageh: Loeb 91 (Ca—294993). Papan: Bünnemeijer 7795 (Bz—18015). Riouw: Teijsmann s.n. [Riow] (Bz—18024). Sabah: Arsat 1158 (N); Cuadra s.n. [North Borneo Forest. Dept. A.2248] (W—2210675); Goklin 788 (N); Kadir s.n. [North Borneo Forest. Dept. A.574] (W—2187085), s.n. [North Borneo Forest. Dept. A.658] (W—2210792), s.n. [North Borneo Forest. Dept. A.2010] (W—2187121) (W—2187121); H. G. Keith 1166 (N, W—1674530); Tangualon bin Tiluan s.n. [North Borneo Forest. Dept. A.1558] (W—2187117); Villamil 217 (Ph, W—1376840); D. D. Wood 785 (Ca—215142, W—1291621). Salajar: Bünnemeijer 6550 (Bz—18012), 7406 (Bz—18010). Sarawak: W. M. A. Brooke 9011 (W—2319758); Clemens & Clemens 20193 [field no. 7162] (Bz—17701, N), 21090 [field no. 143] (N), 21785 [field no. 5655] (N); Foxworthy 281 (W—713261); Native Collector 273 (Ca—213855, W—1173942), 521 (W—1173984), 1077 (W—1174089); Purseglove P. 5167 (N). Siantan: Van Steenis 850 (Bz—18022, Bz—18023). Siberut: Boden-Kloss 14464 (Bz—18053, Ca—286848); Iboet 138 (Bz—18054). Simalur: Achmad 4 (Bz—18026, Bz—18027), 182 (Bz—18025, Ut—53168). Sumatra: Ajoub 299 (Bz—17986); Bangham & Bangham 640 (N), 987 (N); H. H. Bartlett 6936 (Mi, N, W—1551888), 8603 (Mi, N, W—1552910); Bartlett & La Rue 419 (Ca—243884, W—1054007); Boeea 6508 (Mi), 8125 (Mi, W—1682458), 9049 (Mi, N), 9396 (Mi, N), 9549 (Mi, N); Bruinier 189 (Bz—17958); Bünnemeijer 136 (Bz—17981), 263 (Bz—17982), 506 (Bz—17984), 1100 (Bz—17983), 3783 (Bz—17977, Bz—17978, Bz—25476, Ut—58352); Burck s.n. [1883] (Bz—17991); Daalen 394 (Bz—17985); Docters van Leeuwen-Reijnvaan 3288 (Bz—17966); Galoenji 111 (Bz—17974); Gusdorf 43 (Bz—17989); Hamel & Toroes 1165 (Mi, S); Koorders 10602b [146] (Bz—17998); Krukoff 4035 (Br, Bz—17955, N, W—1750502); Lörzing 1001 (Bz—17972), 3137 (Bz—17970), 3806 (Bz—17971), 4609 (Bz—17967, Bz—17968), 4763 (Bz—17969), 8858 (Bz—17957),

9161 (Bz—17965); Lörzing & Jochems 7572 (Bz—17956); Ouwehand 214 (Bz—17987, Bz—17988); Rutten-Kooistra 9 (Bz—17959); Saimo-endt 38 [Posthumus 949] (Bz—17962, Ut—96838); Toroes 164 (Mi, N, S), 3002 (Ca—530971, Mi, N, W—1861277), 4069 (W—1080745), 4293 (N), 4962 (N, W—1681078); Van Steenis 3653 (Bz—18050), 5755 (Bz—17973), 5769 (Bz—17960), 5926 (Bz—17961); H. S. Yates 653 (Ca—234089, Mi), 1066 (Mi), 1486 (Bz—18051, Ca—263963, Mi, N), 1604 (Ca—263963, Mi). Tello: Raap 36 (Bz—18002), 42 (Bz—18003), 57 (Bz—18004). Toedjoeh: Bunnemeijer 5958 (Bz—18019). LESSER SUNDA ISLANDS: Timor: Teijsmann 8922 (Bz—17923). MOLUCCA ISLANDS: Buru: Boerlage 553 (Bz—17930, Bz—17931); Teijsmann s.n. [Boeroe Kajeli] (Bz—17932). Ceram: Buwalda 5846 (Bz—72948); Kornassi 646 (Bz—17927), 773 (Bz—17928, Ut—80197); Rutten 356 (Bz—17926, Ut—80241), 2122 (Bz—17924, Bz—17925). Sanana: Atje 3 (Bz—17934, Bz—17935). AROE ISLANDS: Koboör: Buwalda 5103 (Bz—72573, Ng, Ng—16934). NEW GUINEA: Dutch New Guinea: Aet 108 (Bz—72569); Atasrip 44 (Bz—17940); Djamhari 342 (Bz—72894); Lam 2049 (Bz—25478); Main 411 (Bz—72861, Ng, Ng—16950); Meijer Drees 643 (Bz—72972); Pleyte 667 (Bz—72862, Ng—16958); Sawyer 228 (Ac); F. R. R. Schlechter 13818 (Bz—17938), 14303 (Bz—17937); Thomsen 664 (Bz—17939, Ut—34041a). Territory of New Guinea: M. S. Clemens 41066 (Mi); Hollrung 817 (Bz—17936). Papua: Brass 1015 (Bz—18060), 1415 (Bz—18059); C. E. Carr 15872 (N); Chalmers s.n. (Mb); Hoogland 3653 (Ng, Ng—16835, W—2213634). Province undetermined: M. S. Clemens 8280b (B). CULTIVATED: India: Herb. Hort. Bot. Calcutt. s.n. (Mu, N—photo, N—photo, Z—photo, Z—photo); U. Singh 81 (Ca—361002). Java: Herb. Hort. Bot. Bogor. XV.J.A.XXIX.4 (Bz, Bz, Bz, Bz—26360, Bz—26361), XV.J.A.XXIX.4a (Bz, Bz, Bz, Bz—26362, Bz—26363), XV.J.A.XXX.5 (Bz—17709), XV.J.A. XXX.5a (Bz—17708), XV.J.A.XLV.3 (Bz—17706, Bz—25469, Ca—301567), s.n. (Bz—17711, Bz—17712, Bz—17714, Bz—17715, Bz—17716, Bz—17717, Bz—18028, Bz—18029, Bz—18030). LOCALITY OF COLLECTION UNDETERMINED: Teijsmann s.n. "Blitoeng" (Bz—18007).

CALLICARPA LONGIFOLIA var. *HORSFIELDII* (Turcz.) Moldenke, *Phytologia* 7: 77. 1959.

Synonymy: *Callicarpa horsfieldii* Turcz., *Bull. Soc. Imp. Nat. Mosc.* 36 (2): 217. 1863. *Callicarpus longifolia* var. *horsfieldii* (Turcz.) Moldenke apud Hocking, *Excerpt. Bot. A.* 4: 592, sphalm. 1962.

Bibliography: Turcz., *Bull. Soc. Imp. Nat. Mosc.* 36 (2): 217. 1863; Jacks, in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Koord. & Valet., Bijdr. Kenn. Boomsort. Java 7: 175. 1900; Koord., Exkursionsfl. Java 3: 134. 1912; H. J. Lam, Verbenac. Malay. Arch. 51, 91, & 362. 1919; Bakh. in Lam & Bakh., Bull.

Jard. Bot. Buitenz., ser. 3, 3: 27. 1921; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 64 & 87. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 65. 1948; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 144 & 177. 1949; Moldenke, Résumé 189 & 444. 1959; Moldenke, Résumé Suppl. 1: 13, 16, & 24. 1959; Moldenke, Phytologia 7: 77. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Moldenke, Biol. Abstr. 35: 1687--1688. 1960; Hocking, Excerpt. Bot. A.4: 592. 1962; Moldenke, Résumé Suppl. 13: 6 & 8. 1966.

This variety differs from the typical form of the species in having its petioles, leaf-venation, and inflorescence densely pubescent, the leaf-blades distinctly rhomboid-ovate, the margins very coarsely callose-serrate except at the acuminate apex and long cuneate-acuminate base, and the calyx-rim 5-toothed.

The type of the variety was collected by Thomas Horsfield -- in whose honor it is named -- somewhere in Java and is deposited in the herbarium of the Botanical Garden at Kharkov State University in Kharkov, Russia.

Turczaninow's original description of this taxon is "C. ramis tetragonis simplicibus cum petiolis, nervis foliorum, atque inflorescentia dense pubescentibus; foliis rhombeo-ovatis utrinque longe attenuatis, a medio ad apicem grosse et callose serratis, in utraque pagina pilis raris conspersis et resinoso-punctatis; cymis brevibus petiolos parum excedentibus; calycis dentibus 5 triangularibus majusculis, corollae tubo fere duplo brevioribus; staminibus 4, pyrenis 4 apice barbatis, in statu maturo liberis. In Java legit Horsfield. A duabus species, ad § 1 in prodromo Candollei relatas jam differt dentibus calycinis quinque."

Lam (1919) describes it as "A shrub, branchlets, petioles and cymes densely hairy; branchlets tetragonous; leaves ovate-rhomboid, both sides long attenuate, upper half coarsely serrate, sparsely pubescent on both sides, glandular, denser on nerves; cymes small, as long as or somewhat longer than petioles; calyx 5-toothed; teeth deltoid, rather large; corolla-tube twice as long as the teeth of the calyx; stamens 4; ovary hairy at the top. Distribution: Java. This very imperfectly described species, of which we did not see any specimen, seems to be somewhat doubtful, as regards the 5-toothed calyx, of which the teeth are large-deltoid." Bakhuizen van den Brink (1921) avers that "This doubtful species perhaps is to be considered as an abnormal form of C. longifolia Lam & floccosa Schau."

Only two photographs of the type collection have been examined by me.

Citations: GREATER SUNDA ISLANDS: Java: Horsfield s.n. (Z—photo of type, Z—photo of isotype).

CALLICARPA LONGIPES Dunn, Journ. Linn. Soc. Lond. Bot. 38: 363. 1908.

Synonymy: Callicarpa panduriformis Léveillé in Fedde, Repert. Spec. Nov. 9: 455. 1911. Callicarpa cuspidata Bakh. (in part)

apud P'ei, Mem. Sci. Soc. China 1 (3): 17, in syn. 1932 [not C. cuspidata Hassk., 1921, nor Roxb., 1814]. Callicarpa cuspidata Lam & Bakh. apud Chang, Act. Phytotax. Sin. 1: 274, in syn. 1951.

Bibliography: Dunn, Journ. Linn. Soc. Lond. Bot. 38: 363. 1908; Lévillé in Fedde, Repert. Spec. Nov. 9: 455. 1911; Prain, Ind. Kew. Suppl. 4, pr. 1, 34. 1913; Fedde, Repert. Spec. Nov. Gesamtverz. 58. 1914; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 15, 17--18, 38, 40, & 41, pl. 1. 1932; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 508. 1932; Moldenke, Prelim. Alph. List Invalid Names 10. 1940; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Alph. List Invalid Names 8. 1942; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56 & 87 (1942) and ed. 2, 131 & 177. 1949; Moldenke, Phytologia 3: 139. 1949; Chang, Act. Phytotax. Sin. 1: [269], 274--275, 309, & 311. 1951; Moldenke, Phytologia 4: 121. 1952; Prain, Ind. Kew. Suppl. 4, pr. 2, 34. 1958; Moldenke, Résumé 168, 242, 245, & 444. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Moldenke, Phytologia 8: 273. 1962; Moldenke, Résumé Suppl. 4: 8. 1962; Hocking, Excerpt. Bot. A.6: 535. 1963; Moldenke, Phytologia 14: 59, 99, & 142 (1966), 16: 365 (1968), and 21: 49, 54, 102, 107, & 109. 1971.

Illustrations: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] pl. 1. 1932.

Perennial herb or shrub, about 1 m. tall, softly villous throughout except for the flowers, usually with simple hairs; leaves sessile or subsessile to short-petiolate; petiole (when present) to 5 mm. long; leaf-blades papyraceous or chartaceous, obovate or oblong, 4--13 cm. long, 1.5--5.5 cm. wide, acuminate at the apex, coarsely mucronate-dentate along the upper margins, gradually narrowed from the middle to the rounded or subcordate to cordate base, softly villous; secondaries about 7 per side; peduncles slender, 1.2--3.5 cm. long, villous-pubescent; cymes small, axillary, dense; pedicels to 2 mm. long; calyx 2 mm. long, villous-pubescent and glandulose outside, glabrous within, the rim 4-toothed or -lobed, the lobes or teeth lanceolate, 1.3 or more mm. long, acute or acuminate at the apex, extending to the middle of the calyx; corolla pinkish or red to light-purple or purple, about 4 mm. long, puberulent or pubescent outside, glabrous within, the tube 3.5 mm. long, slightly oblique, gradually ampliate above, the limb 4-lobed, the lobes 1 mm. long, obtuse at the apex; stamens 4, inserted near the base of the corolla-tube, exserted, 8--9 mm. long; anthers oblong, 1.5 mm. long, glandulose on the connective; style filiform, surpassing the stamens, ampliate at the apex; ovary glandulose; fruit pale- or deep-lilac.

This species was based by Dunn on Hongkong Herb. 3390, collected in natural woods near Yenping, Fukien, China, in 1905. Callicarpa panduriformis is based on Chaffanjon 2341 from Kweichow, China. For a time I considered this taxon to be synonymous with C. rubella var. hemsleyana Diels, but I now regard it

as conspecific with C. longipes. Bakhuizen van den Brink (1921) regards C. longipes as a synonym of C. cuspidata Roxb., which, however, is actually C. pedunculata R. Br. The C. cuspidata accredited to Hasskarl is C. longifolia Lam., while that accredited to Bakhuizen van den Brink is in part C. rubella Lindl. and in part C. longipes.

Recent collectors have found C. longipes growing in forests, mixed woods, and thickets, at altitudes of 700 to 820 meters, flowering in June and fruiting in December. They record the vernacular name "sai ip un mat". The specific epithet is uppercased by some writers, for no valid reason. The corolla is described as "pinkish" on Ching 3230, "red" on Peng, Tak, & Kin 561, "red-dish-white" on Sin 10020, "light-purple" on Tsiang 10159, and "purple" on H. H. Chung 3370.

P'ei (1932) comments that "The Fukien plant, Chung 3370, has coarsely dentate leaves which are larger than those of the type and of Peng, Tak and Kin 561. The floral characteristics are the same in all the specimens cited. This species, as the leaf characters, concerned closely resembles Callicarpa Dielsii P'ei differing from it by its long acuminate calyx lobes and denser pubescence on both surfaces of the leaves." He cites a Ching 3230 from Anhwei and Chun 5689 & 5777 from Kwangtung, doubtless deposited in the Arnold Arboretum herbarium, and an isotype (Hongkong Herb. 3390) in the same herbarium. He notes under what he calls C. dielsii that "It appears to me to be closely related to Callicarpa longipes Dunn, the difference being the truncate calyx of Callicarpa Dielsii (Lévl.) P'ei while that of C. longipes Dunn. is toothed." We now regard his C. dielsii as a variety of C. rubella Lindl., namely, C. rubella var. dielsii (Léveillé) Li.

Dop (1932), in describing C. bracteata Dop, says "Cette espèce est voisine du C. longifolia Lam. Elle s'en distingue aisément par les pédoncules des cymes beaucoup plus longs, les bractées foliacées. La longueur du pédoncules la rapprocherait du C. longipes Dunn de Chine et de Hongkong; mais les feuilles longuement atténuées, la calice à dents très petites, l'éloignent nettement du C. longipes à feuilles arrondies ou cordées à la base et à calice divisé jusqu'au milieu."

Chang (1951) cites Tse Hai 547 and nos. 95, 962, 3370, 3927, 4729, 5689, 5777, 5884, 7059, 8666, 12008, 21185, 21320, 25151, 25319, 31621, & 43103 of collectors and/or herbaria for which he gives the names, unfortunately, only in Chinese characters,

Material of C. longipes has been misidentified and distributed in herbaria under the names C. formosana Rolfe, C. giraldiana Pamp., C. longifolia Lam., and C. rubella var. hemsleyana Diels.

In all, 14 herbarium specimens and 3 mounted photographs, including type material of both names involved, have been examined by me.

THE GENUS COLUMNEA (GESNERIACEAE) IN PANAMA

C. V. Morton

I have been working from time to time on Columnea in Panama and Costa Rica for many years. My treatment of the Costa Rican species was published in Standley's "Flora of Costa Rica" in 1938, but I have not published a key to the Panamanian species, which are even more numerous than the Costa Rican perhaps, although there are several Costa Rican species as yet undescribed. It seems that almost every new collection from virgin forests in Central America and Colombia yields undescribed species. When forests are cleared it appears that Columneas are completely exterminated and do not come back in secondary growth, which explains why several of the species have been found only once, and may never be found again.

The division of Columnea into sections by Hanstein, Benthham and Hooker, and by Fritsch is not wholly satisfactory. The matter needs to be considered in depth. Very recently, William T. Stearn published a beautifully prepared and documented paper "The Jamaica Species of Columnea and Alloplectus (Gesneriaceae)" (Bull. Brit. Mus. Nat. Hist. 4 (5): 181-236, t. 14-21. 1969) in which he proposed a new alignment of the species. Columnea is restricted to the section Columnea itself, in which pollination is by humming birds, so far as known, and which is distinguished morphologically by having the four anterior corolla lobes united into a galea and the posterior lobe narrower and spreading or deflexed. The stamens are exserted and the anthers are initially connate. The section Cryptocolumnea would obviously belong here also, although Stearn does not mention it, for it has exactly the same kind of corolla and stamens, and differs only in having the leaves of a pair strongly unequal. Stearn refers all the other species to Alloplectus tentatively, but it does not discuss them in detail.

This is a radical viewpoint, and it does not solve the problems by any means, for it leaves Alloplectus very heterogeneous indeed, including plants with the corollas erect in the calyx or horizontal, bilabiate or regular, contracted in the throat or not; the fruits fleshy berries or capsule-like; the disk composed of five glands or reduced to one. Most importantly, there is no overall resemblance between these "Alloplectus" species, such as ought to characterize a genus regardless of individual characters. Moreover, the method of pollination of most species of Alloplectus remains to be determined and some may indeed be pollinated by humming birds. For these reasons I am not following Stearn in his definitions. It may be remarked that the anthers offer some useful characters, particularly as regards the distinction between Alloplectus and Drymonia.

The chromosome number is $n = 9$ in those Panamanian species so far investigated, namely C. consanguinea, C. hirta, C. nicaraguensis, C. warscewicziana, C. sanguinolenta, C. illepida, and C. moorei

(cf. Cytogenetic Studies in the Genus *Columnnea* L.. by Lawrence Carl Sherk) (MS Thesis, Cornell University, 1960). It should be mentioned also that although I have described the stigmas of the various species as either stomatomorphic or bilobed the distinction is by no means always clear from dried material. This character needs to be studied by itself and in more detail, especially from fresh specimens.

The type of *Alloplectus* Mart. is conserved as *A. sparsiflorus* Mart. That this may not be the best choice will be discussed in a future paper by Mr. Hans Wiehler, who has made some valuable contributions to our knowledge of the relationships of the genera of the Tribe *Columnneae* (Cornell University Thesis, 1970, unpublished.)

Key to the Species of *Columnnea* in Panama

- Corollas regular or if slightly bilabiate the two upper lobes erect, only partially connate, the other 3 free, spreading, the tube contracted in the throat.
- Leaves of a pair equal or subequal. Corolla ventricose, contracted in throat.....sect. I. *Stygnanthe*
- Leaves of a pair strongly unequal, the smaller less than half as long as the larger, sometimes minute and stipule-like.
- Corollas yellow or orange, nearly regular, the lobes subequal; flowers usually fasciculate, crowded, subsessile or very short-pedicellate, erect, bracteate; terrestrial or epiphytic shrubs.....sect. II. *Collandra*
- Corollas red, the limb slightly irregular, sometimes with linear appendages between the lobes; flowers solitary or paired, mostly long-pedunculate; epiphytic, often pendent shrubs.
- Calyx lobes pectinate-fimbriate; leaf-blades glabrous above.
- sect. III. *Stenanthus*
- Calyx lobes entire, serrate, or with a few subulate teeth; leaf-blades hirsute above.....sect. IV. *Ortholoma*
- Corollas strongly bilabiate, the four upper lobes united into a galea, this trilobed, the lateral lobes short and spreading, the central lobe (composed of the connate uppermost lobes) entire or merely emarginate, the lower lobe free, spreading or deflexed, the tube not contracted in throat.
- Leaves of a pair equal or subequal.
- Corolla-tube mostly cylindric, not strongly curved, the lower lobe deflexed; leaf-blades not more than 5 cm. long, usually less (except in *C. nicaraguensis*).....sect. V. *Columnnea*
- Corolla-tube curved, ventricose, the lower lobe spreading; leaf-blades 5-12 cm. long.....sect. VI. *Pentadenia*
- Leaves of a pair strongly unequal, the smaller less than half the size of the larger.....sect. VII. *Cryptocolumnnea*

Sect. I. *Stygnanthe*

- Disk-glands 5; corolla yellow; peduncles 2-2.5 cm. long, erect.
- Leaf-blades ovate to rhombic, 3.2-6.7 cm. wide; calyx lobes strongly serrate.....1. *C. rubida*

- Disk reduced to a solitary posterior gland; corollas red or red with the three lower lobes yellow; peduncles 3-5 cm. long, pendent.
 Calyx-lobes pectinately incised, with 4-6 pairs of linear lateral lobes; leaf-blades broadly elliptic, 10-12 mm. wide; corollas with the galea red and the 3 lower lobes yellow. Corolla with minute appendages between the lobes. 2. C. moorei
 Calyx-lobes subentire; leaf-blades lanceolate, 26-32 mm. wide; corollas entirely red. 3. C. pendula

Sect. II. COLLANDRA

- Corolla 40-50 mm. long, about twice as long as the calyx. Leaf-blades hirsute on both sides.
 Longest leaf of a pair up to 5 cm. long, glandular-pilose; corollas orange, the tube pilose, the lobes yellow, unspotted. 4. C. translucens
 Longest leaf of a pair up to 16 cm. long, hirsute but not glandular; corolla yellow, the lobes red-spotted at base.
 Corolla-tube pilose; leaves green on both sides, not red-spotted beneath. 5. C. silvarum
 Corolla-tube entirely glabrous; leaves red beneath at apex or sometimes all over. 6. C. perpulchra
 Corollas only slightly or not at all exerted from the calyx.
 Leaf blades pilose or hirsute on the upper surface. Calyx-lobes fimbriate-pectinate; leaves toothed.
 Leaves with red tips beneath; calyx-lobes about 15 mm. long; corollas about 17 mm. long. 7. C. pectinata
 Leaves not red-spotted beneath; calyx-lobes and corollas about 30 mm. long. 8. C. purpurata
 Leaf blades glabrous on the upper surface, or only sparingly and deciduously strigillose, entire.
 Leaves not red beneath. Calyx-lobes serrate. 9. C. darienensis
 Leaves red-spotted beneath below apex.
 Calyx-lobes deeply pectinate-fimbriate. 10. C. florida
 Calyx-lobes entire or serrate.
 Stems hirsute; calyx-lobes hirsute; leaf-blades thick. 11. C. crassa
 Stems strigose; calyx-lobes substrigose; leaf-blades chartaceous.
 Corollas densely sericeous. 12. C. consanguinea
 Corollas sparsely glandular-pilose. 13. C. conferta

Sect. III. STENANTHUS

- Leaves glandular-denticulate, often red-spotted beneath; stems strigose. 14. C. sanguinolenta
 Leaves acutely serrate, not red-spotted; stems villous. 15. C. serrata

Sect. IV. ORTHOLOMA

- Corollas with linear appendages between the lobes.

- Corolla-tube sparingly pilose, with most of the surface visible, the tube upwardly with dark lines descending from the sinuses, and the lobes dark margined; calyx-lobes ca. 17 mm. long, green; leaves rose beneath..... 16. C. illepidia
- Corolla-tube densely tomentose, the surface not visible; calyx-lobes 25-30 mm. long; leaves green beneath.... 17. C. dissimilis
- Corollas lacking appendages between the lobes.
- Leaf-blades oblanceolate, green beneath; peduncles 15-45 mm. long; corollas 40-55 mm. long..... 18. C. warscewicziana
- Leaf-blades lanceolate, purple beneath; peduncles very short; corollas 37-40 mm. long..... 19. C. ochroleuca

Sect. V. COLUMNEA

- Corollas densely sericeous externally, the tube not much exceeding the calyx; leaf-blades 7-12 cm. long, minutely strigillose on the upper surface; filaments puberulous.... 20. C. nicaraguensis
- Corollas sparsely pilose externally, the tube mostly much exceeding the calyx; leaf-blades 2-5 cm. long; filaments glabrous (except in C. panamensis and C. mertonii).
- Leaf-blades hairy on the upper surface.
- Calyx-lobes ovate-lanceolate, broadest near the base, deeply toothed.
- Corollas 40-45 mm. long; leaf-blades densely tomentose.
21. C. tomentulosa
- Corollas 50-60 mm. long; leaf-blades sparingly strigose.
22. C. flaccida
- Calyx-lobes narrowed toward base, entire or with 1 or 2 short teeth on each side; corollas (50)65-85 mm. long.
- Stems strigose; calyx-lobes entire. Filaments pilosulous; leaf-blades densely strigose-pilose on both sides.
23. C. panamensis
- Stems spreading pilose or villous; calyx lobes toothed (except in C. localis).
- Calyx-lobes linear-lanceolate or narrowly elongate-triangular.
- Calyx-lobes with 2 pairs of prominent teeth, ca. 15 mm. long; filaments nearly glabrous; corollas ca. 70 mm. long; peduncle-bracts linear; leaf-blades oblong, more than twice as long as broad..... 24. C. hirta
- Calyx-lobes with 1 pair of inconspicuous teeth, 10-12 mm. long; filaments strongly glandular-pilose; corollas 80-85 mm. long; peduncle-bracts deltoid, leaf-blades ovate, less than twice as long as broad. 25. C. mertonii
- Calyx-lobes broadly obovate..... 26. C. localis
- Leaf-blades glabrous on the upper surface.
- Stems stiffly hispid.
- Calyx green, 20-23 mm. long, the lobes with 3 or 4 teeth on each side; corollas 70 mm. long; leaf-blades thin, the veins prominent beneath..... 27. C. consimilis

- Calyx red, 15 mm. long, the lobes with 5 or 6 teeth on each side; corollas 45-60 mm. long; leaf-blades thick, the veins obscure on both sides.....28. C. arguta
- Stems strigose.
- Ovary glabrous, except at apex; corollas 40-45 mm. long, slender, 5-7 mm. wide in throat.
- Calyx-lobes red, toothed in the lower part, prominently pilose on midribs and margins; leaf-blades sharp-pointed, red beneath.....29. C. billbergiana
- Calyx-lobes green, inconspicuously glandular-denticulate, only sparsely pilosulous; leaf-blades merely acutish, green..... 30. C. percrassa
- Ovary densely sericeous or tomentose throughout; corollas (50)60-80 mm. long, 7-15 mm. side in throat.
- Calyx-lobes toothed, the teeth short, broad-based.
- Leaf-blades ovate, obtuse or acutish, 10-16 mm. long.
31. C. oerstediana
- Leaf-blades lanceolate or ovate-lanceolate, acuminate, 20-33 mm. long.....32. C. tenuis
- Calyx-lobes entire.
- Calyx-lobes 12-18 mm. long, about 6 mm. wide; lower lobe of the corolla 14-17 mm. long.33. C. obliqua
- Calyx-lobes 22-30 mm. long, about 10 mm. wide; lower lobe of the corolla 27-30 mm. long...34. C. allenii

Sect. VI. PENTADENIA

- Leaf-blades densely tomentose above, deep violet beneath; corollas 4 cm. long; disk-glands 5..... 35. C. nervosa
- Leaf-blades glabrous or sparingly appressed-pilose above, green or reddish beneath; corollas 6-7 cm. long; disk-gland 1.
- Calyx-lobes hirsute, ovate-lanceolate, about 5 mm. wide at base.
36. C. magnifica
- Calyx-lobes ciliate, otherwise glabrous, ovate, about 15 mm. wide near base..... 37. C. incarnata

Sect. VII. CRYPTOCOLUMNEA

- Leaf-blades more or less hairy on the upper surface.
- Corollas yellow, conspicuously purple-spotted within limb. Calyx-lobes ovate-lanceolate, deeply laciniate-toothed; filaments pilosulous upwardly..... 38. C. maculata
- Corollas red, unspotted, the throat sometimes yellow within.
- Corolla-tube densely white-sericeous; calyx-lobes lanceolate or ovate-lanceolate, 7-9 mm. wide, white-sericeous, especially on the midrib; leaf-blades minutely strigillose above.
20. C. nicaraguensis
- Corolla-tube sparsely pilose; calyx-lobes linear, about 2.5 mm. wide, red-hirsute; leaf-blades densely hirsute above.
39. C. hirsutissima
- Leaf-blades glabrous on the upper surface. Corollas yellow, or yellow lined with rose; filaments glabrous.

Calyx-lobes greenish-yellow, ovate-lanceolate, 30-45 mm. long and 12-14 mm. wide; leaf-blades 20-27 cm. long.

40. C. citrina

Calyx-lobes red, linear-lanceolate, 19 mm. long, 5 mm. wide glandular-serrate; leaf-blades up to 14 cm. long.

41. C. rubra

1. Columnea rubida (Morton) Morton, Baileya 7: 58. 1959.

Alloplectus rubidus Morton, Ann. Mo. Bot. Gard. 24: 204. 1937.

Plants subligulate, the stems ascending, unbranched, about 6 mm. in diameter, pilose near apex; leaves clustered near apex, those of a pair subequal, petiolate; petioles up to 1.7 cm. long, densely pilose; leaf-blades ovate or subrhombic, up to 16 cm. long, 3.2-6.7 cm. wide, membranous, acute or acuminate, decurrent into the petiole, reddish on both sides, obviously serrate-denticulate, pilose above, the hairs reddish, flaccid, multicellular, pilose beneath on the veins, substrigose on the surface, the hairs rigid, 2-celled, the basal cell short, reddish, the terminal cell white, large, acuminate, the lateral veins 8 or 9 pairs; flowers solitary; peduncles 2-2.5 cm. long, pilose, ebracteate; calyx red, about 15 mm. long, the lobes equal, erect, lanceolate, about 5 mm. wide at base, subulate-acuminate, long-pilose externally, pilosulous within, obviously serrate, the teeth about 5 on each side, subulate; corollas yellow, erect, 33-38 mm. long, not spurred at base, about 5.5 mm. in diameter above base, ventricose at the middle and about 10 mm. wide, contracted in throat, here about 7 mm. wide, strigose externally, pilosulous within at base, glabrous upwardly, the limb a little oblique, slightly irregular, the two upper lobes connate throughout into a galea 2.5 mm. long and 8 mm. wide, this truncate, lightly undulate, the lateral lobes rounded, free, semiorbicular, about 2.5 mm. long and 4 mm. wide at base, erect, the lower lobe erect, semiorbicular, mucronate at apex; filaments sparsely pilosulous; anthers free, 2 mm. long, 1.5 mm. wide; ovary long-pilose; style glabrous; disk glands 5.

TYPE: Valley of Upper Río Chiriquí Viejo, in the vicinity of Monte Lirio, Seibert 141.

RANGE: Known only from Panama, at elevations from 1300-1900 meters.

CHIRIQUI: Southwestern slopes of Volcán Baru, in cloud forest at 1,500 m., Summer, 1968, Butcher.

This is one of the species that does not fit comfortably into either Alloplectus or Columnea. I do not believe that any Alloplectus species have five disk glands, but there are some Columneas that do, and consequently the closer alliance may be with Columnea, which is shown also by the erect, unspurred corollas. A species from Chiapas, still undescribed, appears allied.

2. Columnea moorei Morton, Baileya 7: 55, f. 15. 1959.

Trichantha moorei (Morton) Morton, Contr. U. S. Nat. Herb. 38: 10. 1963.

Stems succulent, scandent, at least 30 cm. long and probably much more, unbranched (except probably at base), probably not radicant at the nodes, the internodes very short, about 1 cm. long, fleshy,

minutely strigillose with sharp-pointed, 2-celled, appressed hairs and also with a few multicellular hairs toward the apex, glabrescent, bearing 2 pairs of conspicuous glands (these often coalescent in pairs) at each node between the leaves and just below a "stipular" line; leaves thick-fleshy, dark green and shining above, light green beneath, obviously decussate, those of a pair equal, short-petiolate; petioles 3 mm. long, 1 mm. thick, glabrate; leaf-blades broadly elliptic, very uniform in size, 14-16 mm. long, 10-12 mm. wide, obtuse at base and apex, almost entire but with one or two low, broad, inconspicuous crenations on each side, almost glabrous, bearing a few, minute, appressed hairs beneath especially on the midrib, the margins obviously ciliolate with several-celled hairs; flowers solitary in an axil, bibracteate, the bracts minute, linear, 1-2 mm. long, deciduous, pilosulous; peduncles arching, curved at apex, 30-45 mm. long, slender, 1 mm. thick at base, becoming enlarged and 2-3 mm. thick at apex, red, conspicuously long-setose-pilose, the hairs red, 2-3 mm. long, many-celled, spreading at right angles; calyx green, 5-parted, the lobes erect, equal, 12-15 mm. long, 8-11 mm. wide including the teeth, conspicuously and deeply pectinately parted, the central portion of the lobe lanceolate, about 3 mm. wide, the teeth 4-6 pairs, linear, spreading horizontally, the basal ones about 3-4 mm. long, the uppermost about 2 mm. long, all 0.8-1 mm. wide just above the base, conspicuously red-gland-tipped, the body and teeth externally conspicuously long-red-hirsute, the hairs 2-4 mm. long, many-celled, sharp-pointed, and also with a few, appressed, white, sharp-pointed, 2-celled hairs, within nearly glabrous but with a few stiff red hairs and also slightly glandular; corolla suberect in calyx, red (except the lobes), 50-55 mm. long, gibbous at the posterior base, the gibbosity 3 mm. wide, the tube 3-4 mm. wide just above base, gradually enlarged upwardly but only slightly ventricose, 10-11 mm. wide near apex, sparsely but conspicuously hirsute externally, the hairs 4-6 mm. long, red, many-celled, sharp-pointed, horizontally spreading, and also with minute, spreading hairs, glabrous within except toward throat, where conspicuously glandular-pilosulous, the throat only slightly contracted, the limb slightly bilabiate, the two upper lobes erect, red with narrow yellow margins, rounded, 4 mm. long, connate for about 2 mm., sparsely ciliolate, glabrous within at apex but strongly capitate-glandular lower down, the three lateral lobes clear yellow, not red-margined, slightly plicate at the angles between the lobes, erect, subequal, subdeltoid, about 5-6 mm. wide at the base and 5 mm. long, sparsely hirsute externally, more or less ciliate, glabrous within and not capitate-glandular, the appendages in the sinuses between the lobes yellow, small and hardly discernible in dried specimens; stamens attached to the corolla at the very base, the filaments pale yellowish white, connate at base for 4-5 mm., free upwardly, somewhat curved but not contorted, glabrous, the anthers slightly exserted from the corolla tube, all four permanently connate, subquadrate, about 1 mm. long and wide, the cells oblong, fully dehiscent

longitudinally, glabrous; staminodium none; ovary oblong in outline, 4-4.5 mm. long, densely white-sericeous; style white, straight, 5-5.5 cm. long, exserted, pilosulous; stigma bilobed; disk reduced, to a solitary posterior gland, this white, thick, fleshy, not bilobed, ca. 1-1.5 mm. wide, 1.5-2 mm. long.

TYPE: Panama, cultivated at Bailey Hortorium, Moore in 1958 (US).

RANGE: Known only from the original material, of unknown origin.

3. *Columnnea pendula* (Klotzsch) Hanst. *Linnaea* 34: 397. 1865.

Ortholoma pendulum Klotzsch. ex Oerst. *Centralamer. Gesner.* 52. 1858.

Stems pilose at apex; leaves of a pair subequal, subsessile, leaf-blades obliquely lanceolate, 7.5-10 cm. long, 2.6-3.2 cm. wide, acuminate, rounded at base, subentire, strigose-hirtous above, pubescent beneath, sometimes reddish beneath; flowers solitary (?); peduncles 5 cm. long or more, pendulous, puberulous; calyx about 16 mm. long, the lobes linear-lanceolate, long-acuminate, subentire, pubescent; corolla red, about 50 mm. long, the tube about 6 mm. in diameter at base, ventricose, becoming 14-16 mm. in diameter, contracted in throat and there 10-12 mm. wide, nearly glabrous, the limb only a little irregular, 18 mm. wide, the two upper lobes yellow, partly connate, erect, rounded, the three other lobes subequal, spreading, rounded; ovary pilose; disk reduced to a single posterior gland.

TYPE: Veraguas, Panama, Warszewicz. The holotype in Berlin was destroyed.

RANGE: Known only from the type. This species can be fully known only if new material is discovered.

4. *Columnnea translucens* Raymond, Bot. Notis. 114: 351, f. 4,5. 1961.

Epiphytic subshrub, the branches subrigid, horizontal, short, stout, 3-4 mm. thick, densely covered with glandular hairs and orange-red, multicellular hairs; leaves of a pair unequal, petiolate; petioles 4-5 mm. long, densely hirsute and glandular; larger leaf-blades elliptic-oblong, up to 5 cm. long, 2-3 cm. wide, acuminate, strongly oblique at base, the margins incurved, the smaller similar but only 1.2-2 cm. long and 1 cm. wide; flowers 1-3 in an axil, pedunculate; peduncles 2-4 cm. long, hirsute and glandular; calyx green, the lobes free, subequal, irregular, remotely toothed, the margins incurved, outside hirsute and glandular; corollas orange, translucent, oblique in calyx, much exceeding calyx, 40-50 mm. long, tubular, the base slightly gibbous, the tube becoming 9-11 mm. wide, the limb subregular, the 5 lobes lemon-yellow, triangular, 5 mm. long, incurved; filaments slender, glabrous, shortly united at base; anthers orbicular; ovary white-pilose; stigma bilobed; disk reduced to a single posterior gland. [Description adapted from Raymond]

TYPE: Panama, ex Mrs. M. Cogswell, cultivated in the Montreal Botanical Garden, no. 2940-59, Raymond (MTJB, not seen).

RANGE: Known from the original material only, of unknown origin.

5. *Columnnea silvarum* Morton, Ann. Mo. Bot. Gard. 29: 53. 1942.

Stems 0.6-3.6 meters long, thick, densely red-hispid; leaves of a pair unequal, the larger subsessile; petioles thick, about 2 mm. long; leaf-blades oblong, up to 16 cm. long and 5.5 cm. wide, abruptly short-acuminate, strongly unequal and oblique at base, not amplexicaul, glandular-denticulate, green and pilosulous above, green beneath and hirsute on the veins, the lateral veins about 10 pairs, prominulous; smaller leaf of a pair stipule-like, lanceolate, sessile, about 1 cm. long and 4 mm. wide, acuminate, oblique at base, green; inflorescences 2- or 3-flowered, bracteate, the bracts linear-subulate, about 8 mm. long, 1 mm. wide, entire; peduncles 15-25 mm. long, slender, densely red-hirsute; calyx 20-25 mm. long, the lobes linear-subulate, subequal, about 3 mm. wide at base, long-acuminate, remotely laciniate, the teeth about 3 on each side, 2 mm. long, red-hirsute on both sides; corollas yellow, the lobes purple at base, 40-45 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, enlarged upwardly and a little ventricose, becoming 10 mm. wide, a little contracted in throat, this 7 mm. wide, sparsely pilose externally, pilosulous within at base, the limb subregular, about 1 cm. wide, the lobes spreading, suborbicular, about 3 mm. long, rounded, the two upper slightly connate, glabrous within; filaments glabrous; anthers exserted, coherent, about 2 mm. long and wide; ovary sericeous; style glabrous; stigma shortly bilobed, sparsely glandular-pilosulous.

TYPE: Caña-Cuasi Trail, Chepigana District, Darien, Panama, Terry 1566.

RANGE: Known only from Panama, at elevations from 600 to 1500 meters.

DARIEN: Caña-Cuasi Trail, Chepigana District, Terry 1499.

6. *Columnnea perpulchra* Morton, Ann. Mo. Bot. Gard. 29: 51. 1942.

Plants epiphytic, the stems unbranched, about 7 mm. in diameter toward base, becoming 2.5 mm. in diameter upwardly, densely brown-hirsute, the hairs often 6 mm. long; leaves of a pair strongly unequal, the larger subsessile; petioles scarcely 2 mm. long; leaf-blades oblong-oblancheolate, up to 16 cm. long and 4.7 cm. wide, abruptly short-acuminate, strongly oblique at base but not auriculate or amplexicaul, serrulate, green and pilose above, hirsute beneath and red at apex, or red or red-spotted throughout, the lateral veins about 11 pairs, prominulous beneath; smaller leaf of a pair stipule-like, sessile, ovate, up to 2 cm. long and 1 cm. wide, sharply long-acuminate, strongly oblique at base and auriculate and subamplexicaul on the lower side, hirsute on both sides, red beneath at apex; flowers paired, bracteate, the bracts lance-subulate, about 7 mm. long, entire, acuminate, green, hirsute; peduncles slender, about 20 mm. long, hirsute; calyx pale green, about 20 mm. long, the lobes lanceolate, 3 mm. wide (excluding teeth), acuminate, pilose externally, glabrous within, laciniate, the teeth subulate, up to 3 mm. long, about 6 on each side; corollas yellow, the lobes scarlet at base, about 40 mm. long, spurred at base, the tube 3.5 mm. in diameter above base, abruptly deflexed and ventricose, becoming 8 mm. wide, glabrous

on both sides, a little contracted in throat, this 7 mm. wide, the limb subregular, the lobes reflexed, sparsely strigose externally, the 2 upper connate for about 2 mm., the others free, suborbicular, rounded, all about 5 mm. long, glabrous within; filaments glabrous; anthers included, connate, about 2 mm. long and wide; ovary nearly glabrous; style glabrous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2305.

RANGE: Known only from Panama, at elevations from 40 to 1000 meters.

COLON: Río Fato Valley, Pittier 4209.

7. *Columnnea pectinata* Morton, Ann. Mo. Bot. Gard. 29: 50. 1942.

Plants epiphytic, the stems pendent, 1 meter long, about 8 mm. in diameter, gray-hirsute when young; leaves of a pair unequal, the larger subsessile; petioles scarcely 2 mm. long, hirsute; leaf-blades oblong-falcate, up to 13 cm. long and 5 cm. wide, abruptly acuminate, strongly oblique at base, subauriculate on the lower side, succulent, sharply serrate toward apex, green and hirsute above, paler beneath and scarlet tinged toward apex, densely hirsute, the lateral veins 8-10 pairs; smaller leaves of a pair stipule-like, sessile, lanceolate, about 1.7 cm. long, auriculate at lower side, hirsute; inflorescence several-flowered; peduncles about 5 mm. long, densely hirsute; calyx red, about 15 mm. long, the lobes subequal, about 3 mm. wide, pectinate-toothed, the teeth 5 or 6 on each side, subulate, up to 4 mm. long, densely hirsute on both sides, the hairs hyaline, multicellular, capitate-glandular; corolla orange, only slightly exerted from calyx, about 17 mm. long, a little spurred at base, the tube about 4.5 mm. in diameter above base, a little ventricose upwardly and becoming 6.5 mm. wide, contracted and 5 mm. wide in throat, white-pilose externally, the limb regular, 7 mm. wide, glabrous within, the lobes spreading, suborbicular, about 3 mm. long, rounded; filaments glabrous; anthers included, coherent in pairs, 1.5 mm. long, 2 mm. wide; ovary white-sericeous; style glabrous; stigma stomatomorphic.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2394.

RANGE: Known only from the type locality.

COCLÉ: El Valle de Antón, Allen 1787, 2177, 2919, 2944, 4479.

8. *Columnnea purpurata* Hanst. Linnaea 34: 386. 1865.

Plants epiphytic or terrestrial, 1.2-1.8 m. long, the stems woody, unbranched, 6-10 mm. in diameter, densely yellowish-hirsute; leaves clustered at apex of stem, those of a pair strongly unequal, the larger short-petiolate; petioles 10-15 mm. long, densely hirsute; leaf-blades oblanceolate, 13-30 cm. long, 4-10 cm. wide, long-acuminate, cuneate and strongly unequal at base, serrulate, the teeth 40 to a side or more, pilose on both sides, not red or red-spotted beneath, the lateral veins 9-11 pairs; smaller leaf of a pair sessile, ovate, oblique, up to 3 cm. long and 10 mm. wide, long-acuminate, deeply toothed, hirsute; flowers fasciculate in upper axils, peduncles very short, bracteate, the bracts scarlet, elliptic or lanceolate, about 30 mm. long and 15 mm. wide, long-pilose externally, strigose within, spinulose-toothed, the teeth

subulate, elongate, 4 or 5 to a side; bractlets similar but smaller; calyx scarlet, 30 mm. long, the lobes lanceolate, 5 mm. wide near base, long-acuminate, long-pilose externally, strigose within, spinulose-toothed, the teeth long-red-pilose, 3 or 4 on each side; corollas yellow, 30 mm. long, the tube 4 mm. wide above base, slightly ventricose and becoming 7 mm. in diameter, contracted toward throat, densely brown-sericeous externally, glabrous within, the limb narrow, regular, about 6 mm. wide, the lobes subequal erect, 4 mm. long, 3 mm. wide, sericeous externally, glabrous within; filaments glabrous at base, pilosulous upwardly; anthers connate, 2 mm. long and wide; ovary long-pilose; style glabrous.

SYNTYPES: Costa Rica, Wendland 548, Warscewicz 242, Valentini, s.n.

RANGE: Costa Rica and Panama, at elevations from 50-1500 meters.

CANAL ZONE: Barro Colorado Island, Standley 31393.

DARIEN: Caña, Stern et al. 466; Paca, near Caña, Williams 802; between Pinogana and Yavisa, Allen 285.

PANAMA: Hayes 955.

9. *Columnnea darienensis* Morton, Ann. Mo. Bot. Gard. 29: 46. 1942.

Shrub 1.5-4.5 m. high, the stems scarcely branched, about 3 mm. in diameter toward apex, densely strigose; leaves of a pair strongly unequal, the larger petiolate; petioles 10-14 mm. long, strigose; leaf-blades oblanceolate, 16-23 cm. long, 4-5.5 cm. wide, acuminate, oblique and broadly cuneate at base, not amplexicaul, entire, green and glabrous above, paler beneath, not red-spotted, strigose, especially on the veins, the lateral veins 7 pairs, obscure above; smaller leaf of a pair stipule-like, minute, lanceolate, 1-1.5 cm. long, 3-5 mm. wide, acuminate, glabrous above, strigose beneath, soon deciduous; inflorescence few-flowered, the bracts ovate, about 17 mm. long, acuminate, entire, probably red; peduncles about 5 mm. long, thick, strigose; calyx probably red, ca. 17 mm. long, the lobes lanceolate, 5 mm. wide near base, acuminate, glandular-serrulate, the teeth about 7 on each side, strigose externally on the midrib and margins, glabrous within; corollas orange-scarlet, 24 mm. long, the tube 3 mm. wide above base, upwardly a little ventricose, and becoming 5 mm. in diameter, a little contracted in the throat and here 4.5 mm. wide, densely yellowish strigose externally, the limb small, scarcely irregular, about 5 mm. wide, the lobes erect, suborbicular, rounded, the three lower about 1 mm. long, the two upper 2 mm. long, partly connate; filaments glabrous; anthers 1.5 mm. long and wide; ovary strigose at apex; style glabrous.

TYPE: Cerro de Garagará Sanbú Basin, Darien, Panama, Pittier 5660.

RANGE: Known only from Panama, at elevations from 500 to 1650 meters.

DARIEN: Caña-Cuasi Trail, Chepigana District, Terry 1547.

10. *Columnnea florida* Morton, Journ. Washington Acad. Sci. 27: 310. 1937.

Plants epiphytic, the stems thick, about 1 cm. in diameter, the young ones hirsute, the hairs flaccid, multicellular; leaves of a pair strongly unequal, the larger short-petiolate; petioles thick, about 1 cm. long, densely hirsute; leaf-blades oblanceolate, up to 35.5 cm. long and 10.5 cm. wide, sharply short-acuminate, obtuse and oblique at base, entire, glabrous above or with a few hairs toward base,

appressed-pilose beneath, the costa hirsute at base, paler beneath, conspicuously red-spotted toward apex, the lateral veins about 12 pairs; smaller leaf of a pair subsessile, narrowly elliptic, about 3 cm. long, 6-7 mm. wide, long-acuminate, glabrous above, densely pilose beneath, the veins obscure; flowers fasciculate, few to many; peduncles thick, up to 10 mm. long, densely hirsute, bracteate at middle, the bracts small, lanceolate, densely hirsute; calyx 23 mm. long, the lobes ovate, ca. 10 mm. wide near base, densely hirsute on both sides, pectinate-incised, the teeth numerous, narrowly linear, green, green-hirsute; corollas yellow, thick, ca. 25 mm. long, the tube 5.5 mm. wide at base, not constricted above base, ventricose, becoming 9 mm. wide, densely brown-hirsute externally, sparsely puberulous within, a little contracted in throat, this scarcely 5 mm. wide, the limb nearly regular, about 5 mm. wide, the lobes small, erect, suborbicular, about 2.5 mm. long and 3 mm. wide, glabrate; filaments pilosulous; anthers connate in pairs, oblong, 3 mm. long, 1.3 mm. wide; ovary densely pilose; style pilosulous; stigma slightly bilobed.

TYPE: El General, Prov. San José, Costa Rica, 915 m., Skutch 2436.

RANGE: Costa Rica and Panama, at elevations from 500 to 1100 meters.

DARIEN: Cerro de Garagará, Sambú Basin, Pittier 5664.

11. *Columnnea crassa* Morton, Ann. Mo. Bot. Gard. 29: 45. 1942.

Plants epiphytic, the stems ca. 0.75 m. long, about 10 mm. in diameter, densely hirsute, the hairs brown, thin, multicellular; leaves of a pair unequal, the larger petiolate; petioles about 8 mm. long, very thick, densely hirsute; leaf-blades narrowly oblanceolate, subfalcate, 13-21 cm. long, 3-5 cm. wide, long-acuminate, strongly oblique at base, succulent, entire, green and glabrous above, densely yellow-strigose beneath, bearing one or two red spots about 5.5 cm. below apex, the primary veins about 8 pairs; smaller leaf of a pair stipule-like, sessile, narrowly lanceolate, about 2.5 cm. long and 8 mm. wide, auriculate at lower base and amplexicaul, green, glabrous above, strigose beneath; flowers solitary (?), subsessile; calyx 16-20 mm. long, the lobes subequal, 4-7 mm. wide, acuminate, glandular-serrate, the teeth many, appressed-hirsute externally, subglabrous within except the hirsute midrib; corollas unknown.

TYPE: Cerro Campana, Prov. Panama, Panama, 1000 m., Allen 2423.

RANGE: Known only from the type.

12. *Columnnea consanguinea* Hanst. Linnaea 34: 383. 1865.

Plants terrestrial or epiphytic, the stems unbranched, 0.9-1.2 meters long, 3-5 mm. in diameter, closely sericeous-strigose; leaves of a pair unequal, the larger short-petiolate; petioles ca. 1 cm. long, sericeous; leaf-blades narrowly oblanceolate, 9-25 cm. long, 3.5-6 cm. wide, short-acuminate, oblique at base, rounded at lower base, cuneate at upper, entire, green and glabrous above, strigose and red-spotted beneath, the spots often large and elongate, the lateral veins 6 or 7 pairs; smaller leaf of a pair stipule-like, linear-lanceolate, 1.5-2.5 cm. long, 5-7 mm. wide, long-acuminate, entire; flowers several in an axil, bracteate, the bracts persistent,

yellowish, ovate-lanceolate, 1.5-2 cm. long, 6-8 mm. wide, entire, glabrous above, strigose beneath; peduncles erect, short, ca. 5 mm. long; calyx ca. 16-20 mm. long, green, the lobes equal, lanceolate, acuminate, narrowed toward base, 2.5-4.5 mm. wide near middle, entire or a little serrulate, the teeth few, minute, strigose externally, nearly glabrous within; corollas yellow, 23 mm. long, the tube 5 mm. wide near base, not enlarged upwardly, slightly contracted in throat and here 4 mm. wide, densely sericeous externally, minutely glandular-pilosulous within, the limb regular, 4.5 mm. wide, the lobes erect, equal, 1.8 mm. long, 1.5 mm. wide, sericeous externally, glabrous within; filaments glabrous; anthers 1.5 mm. long and wide; ovary pilose; style glabrous; stigma stomatomorphic.

TYPE: Turrialba, Costa Rica, Wendland 509.

RANGE: Costa Rica and Panama, at elevations from 1200 to 2100 meters.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro de la Horqueta, Allen 4924.

CHIRIQUI: Bajo Chorro, Woodson & Schery 651, Davidson 57; Bajo Mono, Allen 4788.

It is somewhat doubtful if these Panamanian specimens are properly referable to C. consanguinea, for they have the pubescence of the leaves appressed, whereas the typical Costa Rican specimens have a spreading type of pubescence.

13. Columnea conferta Morton, Ann. Mo. Bot. Gard. 29: 44. 1942.

Plants epiphytic, the stems 0.6-1.2 m. long, not branched, about 7 mm. in diameter, strigose, soon glabrous; leaves crowded at apex of stem, those of a pair strongly unequal; petioles up to 4 mm. long, strigose; larger leaf-blades oblanceolate, subfalcate, 28-32 cm. long, 6.5-7 cm. wide, short-acuminate, strongly oblique at base, remotely serrulate, green and glabrous above, sparsely strigose beneath, bearing two red spots about 7 cm. below apex, the lateral veins 10-12 pairs; smaller leaf of a pair stipule-like, deciduous; inflorescence few-flowered, bracteate, the bracts linear, about 2.5 cm. long and 8 mm. wide, long-acuminate, short-petiolate, entire, green; peduncles ca. 9 mm. long, densely strigose; calyx ca. 23 mm. long, the lobes pale, subequal, ovate, about 10 mm. wide near base, sharply long-acuminate, substrigose externally, nearly glabrous within, glandular-serrate, the teeth minute, about 10 on each side; corollas yellow, lined within with red posteriorly, ca. 40 mm. long, a little saccate at base, the tube about 3 mm. in diameter above base, enlarged but not ventricose upwardly, becoming 9 mm. wide, sparsely glandular-pilose externally, glabrous within, scarcely contracted in throat, the limb oblique, probably slightly bilabiate, the lobes subequal, about 6 mm. long, glabrous within; filaments glabrous; anthers not exerted, coherent, about 1.8 mm. long and wide; ovary sparsely pilose; style glabrous; stigma stomatomorphic, glabrous.

TYPE: Caña-Cuasi Trail, Chepigana District, Darien, 1650 m., Terry 1554.

RANGE: Known only from the type.

14. *Columnnea sanguinolenta* (Klotzsch) Hanst. *Linnaea* 34: 389. 1865.
Stenanthus sanguinolentus Klotzsch ex Oerst. *Dansk. Vid. Selsk. Skrivt. V. 5: 123. 1861.*

Stenanthus squarrosus Klotzsch ex Oerst. *loc. cit.* (type from Veraguas, Panama, Warscewicz).

Columnnea costaricensis Kuntze, *Rev. Gen. Plant.* 2: 471. 1891.

Plants epiphytic, the stems unbranched, about 3 mm. in diameter, densely strigose near apex; leaves of a pair strongly unequal, the larger short-petiolate; petioles about 4 mm. long, strigose; leaf-blades oblanceolate, up to 12 cm. long and 2.5-3.5 cm. wide, acuminate, rounded and oblique at base, remotely glandular-denticulate, glabrous above, strigose beneath on veins and surface, often red-spotted beneath (2-6 spots 1.5-3 cm. below apex), the lateral veins 5-7 pairs; smaller leaf of a pair stipule-like, subsessile, lanceolate, 5-22 mm. long, 2.5-6 mm. wide, acuminate, glabrous above, strigose beneath, green, subentire; flowers solitary or paired; peduncles 15-45 mm. long, long-hirsute, the hairs reddish, multicellular, bracteate at base, the bracts sessile, lanceolate, acuminate, glabrous above, strigose beneath, green; calyx green or red, 25-30 mm. long, the lobes ovate in outline, 22-26 mm. wide (including teeth), the central portion 4.5-5 mm. wide, hirsute externally, glabrous within, deeply pectinate-laciniate, the teeth 8-10 on each side, linear-subulate 8-10 mm. long, 0.8-1 mm. wide at base, long-hirsute, the hairs reddish, multicellular; corollas scarlet, ca. 40 mm. long, the tube 4 mm. wide near base, strongly ventricose, becoming 13 mm. wide, contracted toward throat, this 8 mm. wide, sparsely long-pilose externally, glabrous within, the limb subregular, 10-12 mm. wide, the lobes slightly unequal, about 5 mm. long, 3.5-4 mm. wide, glabrous within, the two upper partly connate, erect, the three lower spreading; filaments minutely and sparingly capitate-glandular; anthers included, connate, 2 mm. long and wide; ovary short-sericeous; style glabrous below, glandular upwardly; stigma bilobed.

TYPE: Veraguas, Panama, Warscewicz (photograph US).

RANGE: Costa Rica and Panama, at elevations from sea level to 700 meters.

BOCAS DEL TORO: Water Valley, von Wedel 942; Fish Creek Mountains, vicinity of Chiriqui Lagoon, von Wedel 2310, 2325; Chiriqui Lagoon, von Wedel 1032; Seibert 1562; Changuinola Valley, Dunlap 449.

In the "Flora of Costa Rica," I listed *Columnnea costaricensis* Kuntze in *Alloplectus*, as a doubtful species. The type in the New York Botanical Garden shows that this species is actually merely a variant of *C. sanguinolenta*.

15. *Columnnea serrata* (Klotzsch) Hanst. *Linnaea* 34: 390. 1865.

Stenanthus serratus Klotzsch ex Oerst. *Centralamer, Gesner.* 49. 1858.

Stems hirsute at apex; leaves of a pair unequal; larger leaf-blades obovate-oblong, 7.5 cm. long, narrowly acuminate, acute or obtusish at base, acutely serrate, not red-spotted, glabrous above, hirtous beneath; smaller leaf of a pair about 3 cm. long, obtuse at base;

peduncles equalling corollas, villous; calyx more than half as long as corolla, the lobes subequal, linear, long-acuminate from a broad base, strongly villous externally, cristate-fimbriate, the teeth long-villous; corollas purple, more than 25 mm. long, gibbous at posterior base, pilose; ovary pilose.

TYPE: Veraguas, Panama, Warscewicz (presumably destroyed in Berlin)

RANGE: Known definitely only from the type.

16. Columnnea illepida Moore, Baileya 8: 56, f. 19. 1960.

Trichantha illepida (Moore) Morton, Contr. U. S. Nat. Herb. 38: 12. 1963.

Stems stout, probably not radicant at the nodes, the internodes short, 1-2.5 cm. long, very stout, the upper ones ca. 3 mm. thick, somewhat zigzag, strongly ridged when dry, hirsute, the hairs spreading, yellow, multicellular, eglandular, 2-3 mm. long, borne on tubercles; leaves subdistichous, those of a pair strongly unequal, short-petiolate; petioles 0.3-2 cm. long, hirsute; larger leaf-blades ovate-lanceolate to oblanceolate, up to 13 cm. long and 5 cm. wide, acuminate or sub-cuspidate, broadly cuneate and strongly oblique at base, minutely and remotely denticulate, above green, not bullate, hirsute, the hairs hyaline, several-celled, 1.5-2 mm. long, beneath green with conspicuous red blotches or else red all over, septate-hirsute all over, with also a few, appressed, sharp-pointed, 2-celled hairs, the lateral veins 5 or 6 (or 9?) pairs, slightly elevated on both sides; smaller leaves of a pair early deciduous, like the larger but subsessile, not more than 2.5 cm. long; flowers several in an axil, bracteate, the bracts minute, ca. 4 x 0.75 mm., hirsute and also with sessile yellow glands; peduncles red, slender, 1 mm. thick or less, hirsute; calyx green, herbaceous, 15-20 mm. long, the lobes free, slightly unequal, the posterior shorter and narrower, the central portion 2.5-3.5 mm. wide, strongly pectinate-toothed, the teeth 4 or 5 (6) on each side, linear, the larger 2 mm. long and 0.5 mm. wide, hirsutulous on both sides with hyaline hairs, some of these elongate and many-celled, some short and 2-celled, both surfaces also with sessile, yellow, globular glands; corollas ca. 50 mm. long, slightly oblique in calyx, slightly spurred at posterior base, the tube dull, clear yellow conspicuously striped with maroon from just below the middle to the bases of the sinuses between the lobes, the stripes 0.5-1 mm. wide, the tube 7.5-10 mm. wide at middle, slightly contracted in throat, externally sparsely hirsute and provided also with some small, spreading, 1-celled hairs, within glabrous except for the glandular-pilosulous throat, the limb somewhat bilabiate, ca. 15 mm. wide, the galea 5.5-6 mm. high, bilobed, conspicuously spotted with maroon, the two lateral lobes deltoid, ca. 5 mm. long, 5-6 mm. wide at base, margined with maroon, the anterior lobe ca. 4.5 mm. long and 4 mm. wide at base, margined with maroon, all the lobes hirsute externally and with short, white, thick-based 1-celled hairs also, the appendages between the corolla lobes yellow, inconspicuous when dry and not over 1 mm. long; stamens included; anthers quadrately connate; ovary green, pilose; style puberulous; stigma bilobed; disk reduced to a whitish, bilobed posterior gland.

TYPE: Cultivated in the Bailey Hortorium, Moore (BH, not seen).

RANGE: Known only from the type and a specimen cultivated in Fantastic Gardens, South Miami, Florida, Feb. 25, 1954, R. G. Wilson.

At the time I published on Trichantha in 1963 the native habitat of this species was unknown. It had been variously reported to be from Ecuador, from Tingo Maria, Peru, or from the Panama Canal Zone. Mr. Henry Butcher, of Chiriquí, Panama, has since written me that he was the original collector, and that the species is a native of the Chiriquí region of Panama. There is no reason to doubt this. A possibly allied species (still undescribed because of inadequate material) so far as flowers go has turned up in the same area.

17. Columnnea dissimilis Morton, Ann. Mo. Bot. Gard. 29: 47. 1942.

Plants epiphytic, sparingly branched at base, the branches up to 1 m. long, hispid, the hairs red, spreading, multicellular; leaves of a pair unequal, the larger petiolate; petioles 5-9 mm. long, hispid; leaf-blades elliptic-oblong, up to 7 cm. long and 3 cm. wide, acuminate, strongly oblique at base (rounded on the lower side, cuneate on the upper), entire, green on both sides, pilosulous above, red-hirsute beneath, especially on the veins, the lateral veins about 5 pairs; smaller leaf of a pair mostly subsessile, ovate or sub-orbicular, up to 3 cm. long and 1.8 cm. wide, acute or obtuse, rounded at base; flowers mostly 3 in an axil; peduncles 10-17 mm. long, densely long-red-hirsute; calyx red, 25-30 mm. long, the lobes equal, lanceolate, narrowed toward base, about 6 mm. wide above base, acuminate, remotely glandular-denticulate, red-hirsute on both sides; corollas red tipped with yellow, a little oblique in calyx, 35-40 mm. long, a little spurred at base, the tube about 4 mm. wide above base, slightly ampliate upwardly, densely red-sericeous externally, glabrous within, not contracted in throat, this 8 mm. wide, the limb regular, the lobes white, equal, incurved, ovate, about 4.5 mm. long, thick, scarcely acute, glabrous within, the sinuses between each lobe bearing a subulate, densely hirsute, yellow appendage, this 1-7 mm. long; filaments glabrous; anthers about 2 mm. long and wide; ovary white-pilose; style glabrous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2483.

RANGE: Known only from Panama, at elevations of 600 to 1000 meters.

COCLE: El Valle de Antón, Allen 2164, 2191.

PANAMA: Hills above Campana, Allen 1875.

The peculiar appendages of the corolla vary greatly in length and are often hidden under the dense pubescence.

18. Columnnea warscewicziana (Klotzsch) Hanst. Linnaea 34: 392. 1865.

Ortholoma warscewiczianum Klotzsch ex Oerst. Centralamer. Gesner. 51. 1858.

Ortholoma vestitum Klotzsch ex Oerst. loc. cit. (Type from Veraguas, Panama, Warscewicz).

Plants epiphytic, the stems pendent, branched, 0.6-1.2 m. long, yellowish or reddish-villous at apex, the hairs about 2 mm. long, multicellular; leaves of a pair strongly unequal, the larger subsessile;

petioles 1-3 mm. long, thick, densely hirsute; leaf-blades oblanceolate, 9-12 cm. long, 2-3.5 cm. wide, acuminate, rounded and strongly oblique at base, remotely serrulate, hirsute on both sides (the hairs multicellular), not red-spotted beneath, the lateral veins 10 or 11 pairs; smaller leaf of a pair stipule-like, 7-16 mm. long, 4-7 mm. wide, acuminate, oblique at base, sessile, hirsute; flowers solitary; peduncles 25-45 mm. long, pendent, red-villous, the basal bracts minute, 4-5 mm. long, linear, hirsute, green; calyx green, 10-12 mm. long, the lobes lanceolate, 3 mm. wide near base, long-acuminate, villous on both sides, entire or with 1 or 2 subulate teeth on each side; corollas scarlet, 40-55 mm. long, gibbous at posterior base, the tube 5 mm. in diameter above base, strongly ventricose upwardly, becoming 19 mm. wide, contracted in throat, this 10 mm. wide, sparingly pilose externally, glabrous within, the limb subregular, 13-21 mm. wide, the lobes about 5 mm. long, the two upper partly connate, erect, the three lower spreading; filaments pilosulous; anthers 2 mm. long and wide; ovary sericeous; style glabrous; stigma stomatomorphic.

TYPE: Veraguas, Panama, Warszewicz.

RANGE: Costa Rica and Panama, at elevations from 1200-2400 meters.

CHIRIQUI: El Boquete, Maxon 5703; Cerro de la Horqueta, Pittier 3215; Bajo Chorro, Rio Caldera, Davidson 406, Butcher; Bajo Mono, Allen 4833.

19. Columnnea ochroleuca (Klotzsch) Hanst. Linnaea 34: 393. 1865.

Ortholoma ochroleucum Klotzsch ex Oerst. Centralamer. Gesner. 51. 1858.

Stems slender, strongly yellowish-villous; leaves of a pair strongly unequal; larger leaf-blades lanceolate, subsessile, 5-7.5 cm. long, broadest at middle, 1.4-2 cm. wide, attenuate to a long acuminate apex, attenuate to base, serrulate, hispid-pilose above, long-villous beneath, deep purple beneath; smaller leaf of a pair stipule-like, 1/5 as long as the larger; peduncles short, villous; calyx 8-10 mm. long, the lobes erect, linear-lanceolate, narrowly long-acuminate, bearing a few long subulate teeth; corollas scarlet, about 36-40 mm. long, the tube ventricose, becoming 8 mm. wide, a little narrowed in throat, pilose, the limb slightly irregular, the two upper lobes erect, partly connate, obtuse, the lower lobes spreading, lanceolate; anthers exerted.

TYPE: Veraguas, Panama, Warszewicz (not seen).

RANGE: Known only from the type.

The description has been taken from the original, for no specimens referable to this species have been seen.

20. Columnnea nicaraguensis Oerst. Centralamer. Gesner. 62. 1858.

Plants epiphytic, vinelike, the stems sparingly branched, up to 1 m. long, 6-8 mm. in diameter below, about 2.5 mm. in diameter toward apex constricted at nodes, the epidermis sometimes peeling off in scales, densely appressed-white-pilose when young; leaves of a pair unequal, the larger short-petiolate; petioles up to 3 mm. long, white-villous; leaf-blades leathery, lanceolate, 7-12 cm. long, 2.2-4.5 cm. wide, sharply acuminate, rounded and strongly oblique at base, entire, dark green and thinly strigillose above, light green or dull reddish

beneath (when dry), densely long-strigose on the veins, thinly strigose on the surface, the lateral veins 7-9 pairs, obliquely ascending, obscure above, prominent beneath; smaller leaf of a pair similar to the larger but only 2-2.5 cm. long, 7-10 mm. wide, or rarely larger; flowers solitary; peduncles 7-15 mm. long, densely appressed-white-pilose, bracteate at base, the bracts broadly lanceolate, 7-9 mm. long, about 3 mm. wide, acuminate, hairy on both surfaces; calyx variable, 17-35 mm. long, the lobes lanceolate or ovate-lanceolate, 7-9 mm. wide, broadest near base, long-acuminate, appressed-white-pilose on both sides, especially on the midrib, remotely short-toothed below middle, the teeth mostly 2 on each side, sometimes minute or obsolete, glandular at apex; corollas dark red, marked with yellow within throat, 60-80 mm. long, the tube about 5 mm. in diameter near base, gradually enlarged upwardly, not ventricose, becoming 9-10 mm. wide in throat, densely white-sericeous externally, glabrous within, the limb strongly bilabiate, the galea 35 mm. long, 20 mm. wide, deeply emarginate, densely white-pilose externally, thinly pilose within, the lateral lobes long-connate with galea, the free parts narrow, the upper free margin 11-15 mm. long, the lower lobes spreading, linear, 25-30 mm. long, 4-5 mm. wide, acuminate, densely white-sericeous externally in a broad central line; filaments pilose upwardly; anthers yellow, exserted, connate, 2.5 mm. long, 1.5 mm. wide; ovary sericeous; style densely pilosulous upwardly.

TYPE: San Juan, Nicaragua, Oersted.

RANGE: Nicaragua, Costa Rica, and Panama, at elevations from sea level to 300 meters.

BOCAS DEL TORO: Carleton 256; Water Valley, von Wedel 734, 839; Fish Creek Mountains, von Wedel 2252; Little Bocas, near Chiriqui Lagoon, von Wedel 2522; Chiriqui Lagoon, Hart 142, Changuinola Valley, Dunlap 419, 456; Malamanca Valley, Carleton 133.

21. *Columnnea tomentulosa* Morton, Field Mus. Publ. Bot. 18: 1169. 1938.

Columnnea tomentosa Oerst. Centralamer. Gesner. 64. 1858, not ~~Roxb.~~

Plants epiphytic, 0.2-0.4 m. long, the stems branched, 2-4 mm. in diameter, tomentose; leaves of a pair subequal, short-petiolate; petioles 2 mm. long, tomentose; leaf-blades oval, up to 2.5 cm. long, 9-12 mm. wide, obtuse, broadly cuneate and equal at base, entire, soft-tomentose on both sides, the lateral veins 2 or 3 pairs; flowers solitary; peduncles 7-9 mm. long, white-tomentose, the bracts lanceolate, minute, 4-6 mm. long, 1-2 mm. wide; calyx 7-10 mm. long, the lobes ovate-lanceolate, 5-5.5 mm. wide near base (including teeth), acuminate, deeply subulate-toothed, the teeth 2 or 3 to a side, up to 2.5 mm. long, pilose externally, glabrous within at base, sericeous toward apex; corollas scarlet, the limb margined with yellow, 40-45 mm. long, gibbous at base, the tube 1.5 mm. in diameter above base, enlarged to throat (this 6 mm. wide), pilose externally, glabrous within, the limb bilabiate, the galea oblong, 15 mm. long, 7 mm. wide, obtuse, entire, the lateral lobes long-connate with galea, the free parts 3.5 mm. long, the lower lobe reflexed, linear, 8.5 mm. long, 2.5 mm. wide; filaments glabrous; anthers exserted, oblong, 1.5 mm. long,

0.7 mm. wide; ovary puberulous; style glabrous at base, long-pilosulous upwardly; stigma bilobed.

TYPE: San Juan, Nicaragua, Oersted.

RANGE: Nicaragua, Costa Rica, and Panama, at elevations from sea level to 100 meters.

BOCAS DEL TORO: Rio Cricamola, Woodson, Allen & Seibert 1876, Cooper 206; Valley of Biarra River, Seibert 1538.

22. *Columnnea flaccida* Seem. Bot. Voy. Herald 186. 1854.

Plants epiphytic, the stems slender, up to 2 m. long, 2.5-3.5 mm. in diameter, strigose, soon glabrate; leaves of a pair subequal, very short-petiolate; petioles 1-2 mm. long, strigose; leaf-blades oblong-lanceolate, 2.5-3 cm. long, ca. 1 cm. wide, long-acuminate, rounded at base, entire, succulent, green and sparingly strigose on both sides, the lateral veins about 5 pairs, obscure above; flowers solitary, borne on leafless stems; peduncles about 5 mm. long, hirsute; calyx red, 12-15 mm. long, the lobes linear-lanceolate, 10-14 mm. wide near base (including teeth), long-acuminate, deeply lancinate-toothed, the teeth 3 or 4 on each side, up to 5 mm. long and 0.8 mm. wide, red-hirsute externally, glabrous within except near apex; corollas rose-red with yellow markings, 50-60 mm. long, gibbous at base, the tube 3 mm. wide above base, gradually enlarged upwardly, becoming 7-9 mm. wide in throat, pilose externally, glabrous within, the limb bilabiate, the galea 20-24 mm. long, 12-13 mm. wide, minutely apiculate, the lateral lobes long-connate with galea, the free parts 7-9 mm. long, the lower lobe lanceolate about 10 mm. long, 2.5 mm. wide; filaments glabrous; anthers connate, oblong, 2.5 mm. long, 1 mm. wide; ovary sericeous; style glabrous at base, pilosulous toward apex; stigma bilobed.

TYPE: Gualaca, Chiriquí, Panama, Seemann (not seen).

RANGE: Costa Rica and Panama, at elevations from 80 to 600 meters.

CHIRIQUI: Mula, April 23, 1961, Butcher.

23. *Columnnea panamensis* Morton, Ann. Mo. Bot. Gard. 26: 312. 1939.

Plants epiphytic, the stems sparsely branched, up to 1 m. high, 5-8 mm. in diameter, the branchlets about 3 mm. in diameter, sparsely strigose, short, densely antrorsely strigose, the nodes constricted; leaves of a pair equal, short-petiolate; petioles ca. 4 mm. long, strigose-hirtellous; leaf-blades elliptic or narrowly elliptic, 4-4.5 cm. long, 1.5-1.9 cm. wide, scarcely acute, cuneate at base, entire, densely strigose-pilose on both sides, unspotted, the lateral veins 4 pairs; flowers solitary, ascending; peduncles 15 mm. long, densely white-tomentose; calyx 15 mm. long, the lobes linear-oblong, acute, narrowed toward base, about 4 mm. wide above base, entire, pilose on both sides; corollas scarlet, 65-70 mm. long, gibbous at posterior base, the tube 4 mm. in diameter above base, ampliate upwardly but not ventricose, not contracted in throat (this 10-11 mm. wide), pilose externally, the limb strongly bilabiate, the galea 30-35 mm. long, 14 mm. wide, entire, the lateral lobes long-connate with galea, the free parts 9-10 mm. long, the lower lobe spreading, linear-oblong, 15-17 mm. long; filaments pilosulous; anthers connate,

2.6 mm. long, 1.5-2 mm. wide; ovary densely white-villous; style pilosulous; stigma stomatomorphic.

TYPE: Casita Alta, Volcán de Chiriquí, Prov. Chiriquí, Panama, Woodson, Allen, & Seibert 860.

RANGE: Known only from Panama, at elevations from 1500 to 2100 meters.

CHIRIQUI: Finca Lerida, Woodson & Schery 235, Allen 4763.

24. *Columnnea hirta* Kl. & Hanst. *Linnaea* 34: 403. 1865.

Epiphytic, branched, the branches pendent, terete, 2-2.5 mm. thick (3.5 mm. when fresh), strongly red-hirsute; leaves of a pair subequal; petioles nearly equal, 4-5 mm. long (to 10 mm. when fresh); larger leaf-blades oblong, 3-4.2 cm. long (to 5.3 cm. fresh), 1.3-1.7 cm. wide (2.5 cm. when fresh), rounded at base, obtuse at apex, sparingly toothed, the teeth 3-5 pairs, not prominent in dried specimens, densely pilose on both sides; peduncles 6-7 mm. long (8-9 mm. when fresh), recurved, basally bibracteate, the bracts linear, ca. 3.5 mm. long (4.5 x 1 mm. fresh), pilose externally, glabrous at base within but glandular with sessile globular, shining glands; calyx green, erect, the lobes nearly free, united at base for 1 mm., lanceolate, 12-15 mm. long, narrowed to 2.5 mm. wide at base, 4-5 mm. wide upwardly, long-attenuate to a slender tip, strongly toothed, the teeth normally 2 pairs, 0.5-1 mm. long and 0.5-0.75 mm. wide, densely white-hirsute externally, subglabrous within except toward apex, the basal part with sessile, minute glands; corollas orange-scarlet, not spotted or lined, 70-75 mm. long, the tube gibbous at posterior base, here 3.3-5.5 mm. wide, narrowed above base to 3-4 mm., 35-45 mm. long, not contracted in throat, densely red-pilose externally and also bearing minute, spreading, hyaline hairs but these not prominent, the limb 25-30 mm. long, the throat 11-12 mm. wide, pilosulous within, the galea 16 mm. wide (fresh), cuspidate at the truncate apex, the cusp or appendage bearing several elongate, red, septate hairs, the lateral lobes 13 mm. long and 6 mm. wide at base, the posterior lobe spreading, 18 mm. long and 6 mm. wide, with appendages borne in the sinuses between the lateral lobes and the posterior, these rather prominent, especially in bud, consisting of a protuberance from the tube, this more or less tuberculate at apex, each of the several (up to 10) tubercles surmounted by an elongate red septate hair, with appendages present also between the lateral lobes and the galea but these quite inconspicuous, especially in dried material; filaments connate at base into a sheath 3 mm. long laterally, 5 mm. long anteriorly, roughened below, very sparsely and minutely pilosulous upwardly; anthers quadrately connate, 3-3.5 mm. long and 1.7-2 mm. wide; ovary green, small, 3 mm. long, densely hirsute; style glabrous at base, pilosulous upwardly, scarcely curved at apex; disk reduced to a solitary posterior gland, this 1.5 mm. long and wide, white, glabrous, emarginate.

TYPE: Veraguas, Panama, Warscewicz (presumably destroyed in Berlin).

RANGE: Costa Rica and Panama, at elevations from 600 to 1400 meters.

For an illustration see Morton, *Baileya* 11: 26. 1963.

25. *Columnnea mortonii* Raymond, Bot. Notis. 114: 346, f. 1-3. 1961.

Epiphyte, the stems short, 10-30 cm. long, rigid, fleshy, ca. 4-6 mm. in diameter, brown, densely long-pilose with soft, yellowish, multicellular, glandular, spreading hairs 2-2.5 mm. long, bulbous at base; leaves numerous, crowded; petioles 3-4 mm. long, thick, pilose with soft white hairs; leaf-blades of a pair equal, broadly ovate to suborbicular, 2-2.75 cm. long, 1.2-2 cm. wide, obtuse to rounded at apex, rounded at base, fleshy (ca. 3 mm. thick when fresh) entire, green above, paler beneath, white-pilose on both sides (more sparingly so above), the hairs spreading, soft, the lateral veins 2 or 3 pairs; flowers axillary, solitary; peduncles 3-8 mm. long, glandular-pilose (the hairs white, spreading, red-based), bracteate, the bracts 2, deltoid, minute, ca. 1 mm. long and wide, acute, red-pilose on both sides; calyx-lobes green, linear-oblong, 10-12 mm. long when fresh, 3.5-4 mm. wide, narrowed to base, this ca. 2 mm. wide, long-acuminate, bearing 1 pair of teeth above the middle, glandular-pilose, the hairs spreading, white with red bases; corolla erect in calyx, brilliant red, not spotted, 80-85 mm. long strongly bilabiate, gibbous at posterior base (the gibbosity ca. 3 mm. long), narrowed above base to 5 mm., 7-8 mm. wide at middle, gradually widened to throat, this 12 mm. broad, the tube 45 mm. long, glandular-red-hirsute externally, the galea 20-28 mm. long, 17.5 mm. wide, rounded at apex and submucronate, sulcate on the back, the lateral lobes triangular, 10-15 mm. long, the labellum horizontal, 16-17.5 mm. long, ca. 7 mm. wide, replicate, the limb pubescent within; filaments exerted, united at base for 2 mm., strongly glandular-pilose; anthers oblong, 2.5 mm. long, 2 mm. wide, the cells distinct; ovary densely white-pilose; style glabrous at base, pilosulous upwardly; stigma yellowish green, papillose, bilobed; disk reduced to a posterior gland, this low, fleshy, white, ca. 1 mm. long; berry depressed-globose, fleshy, 15 mm. in diameter, white-pilose.

TYPE: Panama, cultivated in the Montreal Botanical Garden from material received from the Fairchild Tropical Garden, Raymond 1820-56 (holotype MTBG, not seen; isotype US).

RANGE: Probably local in Panama, perhaps from the Chiriquí region, but not known definitely in the wild.

This species is very floriferous and beautiful in cultivation in the Longwood Gardens. It is like *C. hirta* in many ways, but the leaves are shorter petiolate, the blades broader, the bracts minute and deltoid, the calyx hairs red-based, the calyx-lobes less toothed, and the filaments glandular-pilose.

26. *Columnnea localis* Morton, Field Mus. Publ. Bot. 18: 1165. 1938.

Columnnea microcalyx var. *macrophylla* Donn. Smith, Bot. Gaz.

31: 118. 1901, not *C. macrophylla* Kuntze.

Plants epiphytic, the stems yellowish, slender, branched, about 1.5 mm. wide, white-pilose; leaves of a pair subequal, short-petiolate; petioles 1.5 mm. long, densely white-pilose; leaf-blades oblong-elliptic, 2-5 cm. long, 1.1-1.7 cm. wide, acute or obtuse, rounded at base, thin, slightly toothed, soft-pilose on both sides, the lateral veins 3 pairs, obscure above; flowers solitary, ebracteate; peduncles 15-25 mm. long, pilose; calyx green, 12 mm. long, the lobes oblanceolate, acute, narrowed at base, here 1.3 mm. wide, broadest near middle, here 3-5.5 mm. wide, acute, entire, pilose on both sides; corollas rose-pink, 70 mm. long, gibbous at base, the tube 3 mm. wide above base, ampliate upwardly, 11-12 mm. wide in throat, thinly pilose externally, the limb bilabiate, glandular-pilosulous within, the galea 30-45 mm. long, ca. 20 mm. wide, rounded, the lateral lobes long-connate with galea, the free parts broad, 10-12 mm. long, the lower lobe deflexed, linear, ca. 22-30 mm. long, 5 mm. wide; filaments glabrous; anthers connate, 3.5 mm. long, 2 mm. wide; ovary white-villous; style pilosulous throughout; stigma bilobed.

TYPE: Tucurrique, Costa Rica, Tonduz 12932.

RANGE: Costa Rica and Panama, at elevations from 500 to 2500 meters.

CHIRIQUI: Cerro Punta to headwaters of Rio Caldera, Allen 1428; Bajo Chorro, Davidson 76; Cerro de la Horqueta, von Hagen 2162.

DARIEN: Cerro de Garagara, Sambu Basin, Pittier 5625.

VERAGUAS: Cerro Tute, near Santa Fe, Allen 4381.

27. *Columnnea consimilis* Morton, Proc. Biol. Soc. Wash. 69: 194. 1956.

Plants epiphytic, the stems 0.5 m. long or more, apparently unbranched, yellowish, about 1.5 mm. in diameter, setose-hispid, the hairs reddish, several-celled, stiffly spreading; leaves borne in two's or three's, those of a whorl equal, short-petiolate; petioles 2-2.5 mm. long, reddish-hispid; leaf-blades rather thin, ovate-lanceolate, 1.6-2.8 cm. long, 6-12 mm. wide, sharply acuminate, rounded and subequal at base, entire, green and glabrous above, pale beneath, very sparingly strigillose, the lateral veins 2 pairs, prominent beneath; flowers solitary (?); peduncles ca. 10 mm. long, coarsely red-setose; calyx green, 20-23 mm. long, the lobes lanceolate in outline, about 8 mm. wide (including teeth), long-acuminate, the teeth 3 or 4 on each side, linear-lanceolate, up to 4.5 mm. long and 1.5 mm. wide at base, glandular at apex; corollas scarlet with pale yellow stripes within, ca. 70 mm. long, the tube 3.5 mm. in diameter near base, gradually enlarged upwardly, becoming 10 mm. wide in throat, sparingly pilose externally, glabrous within, the limb strongly bilabiate, the galea 33 mm. long, 23 mm. wide, emarginate, the lateral lobes partly connate with galea, the free parts about 15 mm. wide at base, the upper margin about 16 mm. long, the lower lobe reflexed, oblong, about 20 mm. long, 11 mm. wide; filaments glabrous; anthers connate, oblong 3 mm. long, 1.2 mm. wide; ovary pilosulous above middle; style pilosulous throughout; stigma deeply bilobed.

TYPE: Cerro Tute, near Santa Fé, Prov. of Veraguas, Panama, 750 m., Allen 4380.

RANGE: Known only from the type.

28. *Columnea arguta* Morton, Ann. Mo. Bot. Gard. 29: 43. 1942.

Plants epiphytic, the stems pendent, elongate, ca. 1.5 mm. in diameter, rigidly red-pilose when young; leaves of a pair equal; petioles hispid, about 1 mm. long; leaf-blades lanceolate, 1.6-2 cm. long, 6-7 mm. wide, long-acuminate, rounded at base, a little oblique, thick, entire, ciliate, glabrous on both surfaces, green above, reddish beneath, the lateral veins one or two parts, obscure; peduncles 7-9 mm. long, hispid; calyx ca. 15 mm. long, the lobes subequal, 9 mm. wide at base, hirsute on both sides, strongly toothed at base, the teeth 5 or 6 on each side, elongate, up to 3 mm. long and 1 mm. wide; corollas red, the throat lined with yellow, 45-60 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, 7-10 mm. broad in throat, sparsely pilose externally, glandular within at base, the limb bilabiate, glabrous within, the galea 20 mm. long and 13-27 mm. wide, emarginate at apex, the lateral lobes long-connate with galea, the upper free margin 8-13 mm. long, the lower lobe elliptic, reflexed, 9-20 mm. long and 7.5-11 mm. wide; filaments glandular below, glabrous upwardly; ovary sericeous, especially toward apex; style sparsely pilosulous; stigma truncate.

TYPE: El Valle de Antón, Prov. of Coclé, Panama, ca. 1000 m., Allen 2336.

RANGE: Known only from El Valle de Antón.

COCLE: El Valle de Antón, Allen 3718.

29. *Columnea billbergiana* Beurl. Svensk. Vet. Handl. 1854: 135. 1854.

Plants epiphytic, the stems brown, branched, 2-4 mm. in diameter, sparsely strigose when young; leaves of a pair subequal; petioles 2.5-5 mm. long, strigose; leaf-blades ovate-lanceolate, 2-3 cm. long, 8-11 mm. wide, acute, broadly cuneate at base, entire, glabrous above, pale beneath, strigose on veins and surface, the lateral veins 3 pairs; flowers solitary; peduncles 5-10 mm. long, densely long white or pink-pilose, the bracts minute, linear-lanceolate, 5-7 mm. long, 1.5-2 mm. wide, acuminate, entire, glabrous above, strigose beneath; calyx red, 9-12 mm. long, the lobes ovate-lanceolate, 5-8 mm. wide near base, sharply and abruptly long-acuminate, white-sericeous externally, glabrous within, dentate, the teeth 1-4 on each side, broad-based, glandular, sometimes minute; corollas scarlet, 40-50 mm. long, the tube 1.5-2.5 mm. in diameter near base, only a little enlarged upwardly, becoming 5-6 mm. wide in throat, sparsely glandular-pilose externally, sparsely glandular within near base, the limb strongly bilabiate, the galea about 20 mm. long and 6-7 mm. wide, apiculate, the lateral lobes long-connate with galea, the free parts about 4 mm. long, the lower lobes deflexed, linear or lanceolate, about 12-18 mm. long and 1.5-3 mm. wide; filaments glabrous; anthers exserted, oblong, 2 mm. long, 1-1.2 mm. wide; ovary glabrous except for the sparsely white-pilose apex; style glandular-pilosulous; stigma bilobed.

TYPE: Portobello, Colón, Panama, Beurling.

RANGE: Known only from Panama, at elevations from sea level to 1000 meters.

CANAL ZONE: Lake shore only Gatun River, Pittier 6516; Frijoles, Maxon 6553.

COCLE: El Valle de Antón, Allen 1651, 2149, 2353, 3412, Hunter & Allen 303, 564.

PANAMA: Cerro Campana, Allen 2428, 2432.

30. *Columnnea percrassa* Morton, *Baileya* 7: 59. 1959.

Stems olive green, fleshy, terete, unbranched (at least upwardly), 3 mm. thick, becoming only 2 mm. thick upwardly, sparsely and minutely strigillose, the internodes about 2 cm. long; paired glands present between the leaves; leaves of a pair subequal, short-petiolate; petioles 5-7 mm. long, minutely strigillose; leaf-blades thick and fleshy, dark green and glossy above, pale green beneath, elliptic, narrowly elliptic, or subrhombic, 2.5-3.5 cm. long, 1.1-1.5 cm. wide, slightly rounded or acutish at apex, broadly cuneate at base, entire, glabrous above, beneath minutely puberulous on the midribs, sparsely strigillose on the surfaces, weakly ciliolate, the primary veins 3 pairs; flowers solitary, axillary; peduncles green, recurved, 15-20 mm. long, terete, ca. 1 mm. thick, thickened toward apex, rather strongly white-pilosulous, especially toward the apex; calyx green, 10-12 mm. long, the lobes free, equal, broadly subdeltoid, broadest at base, here 5-6 mm. wide, truncate at base, the margins recurved and lying flat against the adjacent lobes to make a 5-angled, 5-winged calyx, sharply long-acuminate at apex, inconspicuously glandular-denticulate, the glands ca. 4 on each side, inconspicuously strigillose externally, sparsely white-pilosulous on the midrib, laxly ciliolate, glabrous within; corollas scarlet, tube orange and red within and with a yellow line from the throat, 55-60 mm. long, slightly oblique in calyx, gibbous at posterior base, the gibbosity ca. 3 mm. long, the tube ca. 3 mm. wide just above base, narrow, gradually enlarged upwardly but not ventricose or curved, becoming ca. 6 mm. wide in throat, sparsely red-pilosulous externally, the hairs several-celled, horizontally spreading, gland-tipped, the limb strongly bilabiate, the galea ca. 27 mm. long and 9 mm. wide (spread out), slightly acutish at apex, the 2 upper lobes completely united, the two lateral lobes almost completely connate with the upper lobes, the free parts triangular, minute, ca. 3 mm. long, recurved, the lower lobe erect at base but arching toward the apex or reflexed, ca. 17 mm. long, 3 mm. wide at base; filaments inserted in the very base of the corolla tube, connate for ca. 2.5 mm., whitish below, reddish above; anthers exserted from the corolla tube, persistently connate, subquadrate, ca. 1.2 mm. long and wide, glabrous; ovary green, ovoid, glabrous below, pilose toward the apex; style pilosulous toward the apex; stigma bilobed, exserted; disk reduced to a thick fleshy, white, bidentate, posterior gland 1.5 mm. long and 2 mm. wide.

TYPE: Cerra Campana, Province of Panama, 1000 m. alt., Apr. 21, 1941, Allen (US).

RANGE: Known only from the type locality and from cultivated material.

PANAMA: Cerro Campana, 400 m., Hutchison & Dressler 2952, cult UCBG, no. 63.2742.

WITHOUT LOCALITY: Cultivated BH, from material received from Mrs. M. Cogswell, possibly originally from Henry Butcher (Moore 7557 bis).

31. Columnnea oerstediana Klotzsch ex Oerst. Centralamer, Gesner.

61. t. 8. 1858.

Plants epiphytic, pendulous, 0.6-1.2 m. long, the stems branched, 2-3 mm. in diameter near apex, sparingly strigose, glabrescent; leaves of a pair equal, short-petiolate; petioles ca. 2-3 mm. long, strigose; leaf-blades ovate, 1-1.6 cm. long, 6-10 mm. wide, succulent, obtuse or acutish, rounded at base, entire or slightly toothed at base, green, glabrous above, thinly strigose beneath, the lateral veins 3 pairs, obscure above; flowers solitary, ebracteate; peduncles 8-10 mm. long, thinly strigose; calyx green 14-16 mm. long, the lobes ovate, 6-8 mm. wide above base, sharply long-acuminate, sparsely strigillose externally, glabrous within, dentate toward base, the teeth 3 or 4 to a side, glandular, less than 1 mm. long; corollas scarlet, 60-70 mm. long, the tube about 4 mm. in diameter near base, gradually enlarged upwardly, becoming 8-9 mm. wide in throat, sparsely pilose externally, glabrous within, the limb strongly bilabiate, the galea 25-35 mm. long, 13-15 mm. wide, truncate, the lateral lobes long-connate with galea, the free parts about 8 mm. long, the lower lobe deflexed, linear-lanceolate, 12-18 mm. long, 3-5 mm. wide; filaments glabrous; anthers connate, oblong, 2 mm. long, 1 mm. wide; ovary white-sericeous; style glabrous below, short-puberulous toward apex; stigma bilobed.

TYPE: Naranjo, Costa Rica, Oersted.

RANGE: Costa Rica and Panama, at elevations from 900-2200 meters.

VERAGUAS: Cerro Tute, near Santa Fé, Allen 4335.

32. Columnnea tenuis Klotzsch ex Oerst. Centralamer, Gesner. 63. 1858.

Plants epiphytic, the stems whitish, branched, 2-3 mm. in diameter, sparingly strigose when young; leaves of a pair subequal, short-petiolate; petioles 1-1.5 mm. long, strigose; leaf-blades lanceolate or ovate-lanceolate, 2-3.3 cm. long, 5-12 mm. wide, long-acuminate, the base a little oblique, broadly cuneate to rounded, entire, glabrous above, pale beneath, strigose on the veins, sparingly strigillose on the surface, the lateral veins 3 pairs; flowers solitary; peduncles 6-9 mm. long, white-strigose, the bracts minute, about 6 mm. long, 1 mm. wide, acuminate, entire, glabrous above, strigose beneath; calyx reddish, 11-16 mm. long, the lobes ovate-lanceolate in outline, 5-9 mm. wide near base, long-acuminate, sparingly strigose externally, glabrous within, deeply toothed, the teeth deltoid, mostly 1-3 to a side, broad-based, up to 2.5 mm. long and 2 mm. wide at base; corollas scarlet, 60-70 mm. long, the tube about 4 mm. in diameter above base, gradually enlarged upwardly, becoming 11 mm. wide in throat, sparingly pilose externally, glabrous

within, the limb strongly bilabiate, glabrous within, the galea ca. 30 mm. long, 15 mm. wide, truncate, the lateral lobes long-connate with galea, the free parts about 11 mm. long, the lower lobe reflexed, lanceolate, 13-17 mm. long, 4-6 mm. wide; filaments glabrous; anthers connate, 2.5-3 mm. long, 1.2 mm. wide; ovary white-tomentose; style glabrous below, pilosulous above; stigma bilobed

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Known only from Panama, at elevations from 1200 to 2100 meters.

CHIRIQUI: El Boquete, Maxon 5573, Maurice 855; Cerro de la Horqueta. Pittier 3186, Maxon 5407, von Hagen 2132, 2163; Bajo Chorro, Río Caldera, Davidson 257, Butcher; Bajo Mono, Allen 4820.

BOCAS DEL TORO: Allen 4935.

33. *Columnnea obliqua* Morton, Ann. Mo. Bot. Gard. 29: 49. 1942.

Plants epiphytic, the stems unbranched, elongate, pendulous, about 2.5 mm. in diameter, sparsely yellow-strigose, soon glabrous; leaves of a pair equal, subsessile; leaf-blades lanceolate, up to 3.5 cm. long and 1.2 cm. wide, long-acuminate, rounded and strongly oblique at base, entire, succulent, green and glabrous above, paler and reddish beneath, strigose on the margins and veins; flowers solitary; peduncles 7-15 mm. long, 1 mm. thick, substrigose; calyx green, 12-18 mm. long, the lobes equal, ovate, ca. 6 mm. wide at base, abruptly narrowed and sharply long-acuminate, entire, sparsely strigose externally, glabrous within except for the pilosulous base; corollas orange, 65-80 mm. long, a little spurred at base, the tube 3.7 mm. in diameter above base, enlarged upwardly but not ventricose, becoming 12 mm. wide in throat, sparsely pilosulous externally, glabrous within, the limb strongly oblique, bilabiate, the galea 33-38 mm. long, entire, the lateral lobes long-connate with galea, the free parts 13 mm. long, the lower lobe reflexed, linear-oblong, 14-17 mm. long; filaments glabrous; anthers connate in pairs, 1.6 mm. long, 1 mm. wide; ovary white-sericeous; style sparsely pilosulous; stigma bilobed; posterior disk gland large, emarginate, the anterior small linear-subulate.

TYPE: Bajo Chorro, Prov. of Chiriquí, Panama, Woodson & Schery 607.

RANGE: Known only from the Province of Chiriquí, Panama, at elevations of 1800-2100 meters.

CHIRIQUI: Bajo Chorro, Woodson & Schery 677; Cerro de la Horqueta, Allen 4971.

34. *Columnnea allenii* Morton, Ann. Mo. Bot. Gard. 29: 42. 1942.

Plants epiphytic, pendulous, the stems scarcely branched, sparsely strigose, about 1.5 mm. in diameter; leaves of a pair equal; petioles red-strigose, ca. 3 mm. long; leaf-blades oblong-elliptic, succulent, up to 2 cm. long and 1.1 cm. broad, short-acuminate, rounded at base, not oblique, entire, glabrous on both sides, the veins obscure; flowers solitary, ebracteate; peduncles 17-20 mm. long, red-strigose, the hairs multicellular, flaccid; calyx red-tinged, 22-30 mm. long, the lobes ca. 10 mm. broad at base, a little unequal, entire, sharply long-acuminate, slightly strigillose outside, ciliate, long-hirsute

within at base; corollas scarlet, 68-75 mm. long, subcalcarate at base, the tube equalling the calyx, 4 mm. in diameter above base, enlarged upwardly, 15 mm. wide in the throat, sparsely pilose externally, the limb strongly bilabiate, the galea 40-45 mm. long, about 25 mm. wide, truncate at apex, the lateral lobes long-connate with galea, the free parts about 14 mm. long, the lower lobe reflexed, oblong-lanceolate, 27-30 mm. long, 7-8 mm. wide; filaments glabrous; anthers exserted, connate in pairs, oblong, about 3 mm. long and 1 mm. wide; ovary white-pilose; style pilosulous; stigma bilobed.

TYPE: El Valle de Antón, Coclé, Panama, Allen 2179.

RANGE: Known only from El Valle de Antón, Panama, at about 1000 meters elevation.

COCLE: El Valle de Antón, Allen 3554; Cultivated BH, Moore 7545.

35. Columnnea nervosa (Klotzsch) Hanst. *Linnaea* 34: 401. 1865.

Pendadenia nervosa Klotzsch ex Oerst. *Centralamer. Gesner.*

57. 1858.

Stems short-tomentose at apex; leaves of a pair subequal, short-petiolate; leaf-blades oval-elliptic, a few inches long, acute, obtuse at base (?), lightly serrulate, densely tomentose above, villous-pubescent and deep violet beneath; peduncles hirsute, shorter than the flowers; calyx ca. 13 mm. long, the lobes lanceolate, long-acuminate, incised-dentate, tomentose; corollas red (?), 40 mm. long, the tube 4 mm. in diameter at base, sigmoid-curved, ventricose, becoming 10-12 mm. in diameter, contracted in throat and there 7 mm. wide, the limb bilabiate, oblique, the galea erect, about 12 mm. long, emarginate, the lateral lobes long-connate with galea, broad, obtuse, the lower lobe lanceolate-oblong, porrect; anthers exserted; ovary villous; disk glands 5, the 2 posterior connate.

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Known only from the type.

The above description is adapted from the original and from Hanstein.

36. Columnnea magnifica Klotzsch & Hanst. ex Oerst. *Centralamer. Gesner.* 60. 1858.

Columnnea wendlandiana Hanst. *Linnaea* 34: 402. 1865.

Columnnea oblanceolata Sprague, *Kew Bull. Misc. Inf.* 1908: 449. 1908.

Plants epiphytic, 0.3-1.2 m. long, the stems erect, sparingly branched, the branches 3-5 mm. in diameter, hirsute; leaves of a pair subequal; petioles 6-15 mm. long, hirsute; leaf-blades oblanceolate or elliptic-oblanceolate, 5-11 cm. long, 1.3-3.5 cm. wide, acute or very short-acuminate, cuneate to subrounded at base, oblique or nearly equal at base, entire or nearly so, above dark green, appressed-pilose or nearly glabrous, beneath pale green or reddish but lacking definite red spots, stiffly appressed-pilose on the veins, strigillose on the leaf surface, the primary veins 5-7 pairs, impressed above, prominulous beneath; flowers 1-3 in an axil; peduncles 10-20 mm. long, hirsute; calyx reddish, 13-15 mm. long, the lobes ovate-lanceolate,

ca. 5 mm. wide near base, sharply long-acuminate, hirsute externally, nearly glabrous within except near apex, coarsely glandular-toothed, the teeth 4 or 5 on each side; corollas scarlet, the lower lobes yellow within, 60-70 mm. long, the tube ca. 4 mm. in diameter near base, strongly ventricose upwardly, becoming 12-15 mm. in diameter, not contracted in throat, pilose externally, minutely pilosulous within, the limb very large, strongly bilabiate, the galea 33-40 mm. long, 22-28 mm. wide, rounded and entire, pilosulous within, the lateral lobes partly connate with galea, the free parts 12-14 mm. long, the lower lobe spreading, lanceolate, 25-28 mm. long; filaments densely pilosulous throughout; anthers oblong, about 3 mm. long and 2 mm. wide; ovary pilose; style pilosulous; stigma deeply bilobed; disk reduced to a deeply bilobed posterior gland.

TYPE: Veraguas, Panama, Warscewicz (not seen).

RANGE: Costa Rica and Panama, at elevations from 1500-2700 meters.

No Panama specimens have been seen, but the species is a conspicuous and abundant plant in the mountains of Costa Rica.

37. *Columnea incarnata* Morton, Ann. Mo. Bot. Gard. 29: 48. 1942.

Plants epiphytic, the stems scarcely branched, sulcate, about 3 mm. in diameter, yellow-strigose, finally glabrous; leaves of a pair subequal; petioles 1.3-2.3 cm. long, strigose; leaf-blades oblanceolate, 7-12 cm. long, 2.3-4 cm. wide, long-acuminate, cuneate and not oblique at base, entire, a little succulent, green and glabrous above, paler beneath and not red-spotted, strigose on margins and veins, the lateral veins 4 or 5 pairs, obscure above; flowers solitary or paired, bracteate, the bracts linear-subulate, ca. 7 mm. long, 1.5 mm. wide at base, acuminate, entire, strigose externally, glabrous within; peduncles nodding, 30-40 mm. long, densely yellow-strigose; calyx 33-35 mm. long, the lobes green, ovate, ca. 15 mm. wide near base, sharply long-acuminate, remotely glandular-denticulate, glabrous on both surfaces, sparsely ciliate; corollas pink, 65-70 mm. long, a little saccate at base, the tube 5 mm. in diameter above base, abruptly ventricose, ca. 20 mm. long, not exceeding the calyx, puberulous externally, glandular within, the limb bilabiate, curved, strongly oblique, pilose externally, glabrous within, the galea ca. 50 mm. long, 35 mm. wide, truncate, the lateral lobes long-connate with the galea, the free parts ca. 23 mm. long, 13 mm. wide, rounded, the lower lobe spreading, ca. 30 mm. long and 11 mm. wide; filaments densely glandular-puberulous; anthers exserted, coherent, oblong, 3 mm. long and 1 mm. wide; ovary white-sericeous, pilose at apex; style glabrous; stigma bilobed.

TYPE: Bajo Chorro, Prov. of Chiriquí, Panama, Woodson & Schery 608.

RANGE: Known only from Panama, at elevation from 1800-2100 meters.

BOCAS DEL TORO: Northern slopes of Cerro de la Horqueta, Allen 4948.

38. *Columnea maculata* Morton, Proc. Biol. Soc. Washington 69: 194. 1956.

Shrub, the stems apparently unbranched, thick, 12 mm. in diameter below, 5 mm. in diameter near apex, coarsely hispid, the hairs yellowish, multicellular, borne at the apex of bulbous tubercles;

leaves of a pair strongly unequal, the larger subsessile; petioles 1-2 mm. long, hispid, thick; leaf-blades coriaceous, narrowly oblong, 15-23 cm. long, 6-7 cm. wide, acutish, the base oblique, rounded on the lower side, broadly cuneate on the upper, entire, slightly revolute-margined, green and sparsely pilose above, paler beneath and red at tip, sparsely pilose throughout, the lateral veins 6 or 7 pairs, obscure above, prominent beneath; smaller leaf of a pair deciduous, not seen; flowers apparently solitary in the axils, subsessile; peduncles thick, 1-2 mm. long, densely hispid; calyx ca. 19 mm. long, the lobes ovate-lanceolate, 10-12 mm. wide (including teeth), long-acuminate, broadest near base, densely yellowish-hirsute on both sides, laciniately toothed, the teeth 8-10 on each side, linear-lanceolate, the larger 4 mm. long, 1 mm. wide at base, glandular at apex; corollas yellow, the galea conspicuously spotted with purple within, the other lobes with broad purple lines, 75 mm. long, the tube saccate at posterior base, 4 mm. in diameter above base, not ventricose, gradually enlarged to throat, this about 7 mm. wide, densely white-pilose externally, the limb strongly bilabiate, the galea 32 mm. long, 14 mm. wide, rounded, pilose within, the lateral lobes long-connate with galea, the upper free margin about 13 mm. long, the lower lobe deflexed, lanceolate, 20 mm. long, 5 mm. wide, acuminate; filaments densely pilosulous upwardly; anthers exserted, connate, 3 mm. long, 1.2 mm. wide; ovary sericeous; style glabrous at base, pilosulous upwardly.

TYPE: Fish Creek Mountains, Prov. of Bocas del Toro, Panama, von Wedel 2280.

RANGE: Known only from the type.

39. *Columnnea hirsutissima* Morton, Ann. Mo. Bot. Gard. 29: 47. 1942.

Plants epiphytic, the stems unbranched, 0.13-0.3 m. long, strongly red-hirsute, the hairs multicellular, about 5 mm. long; leaves of a pair strongly unequal, the larger subsessile; petioles thick, 1-2 mm. long, hirsute; leaf-blades oblong or narrowly oblong, 6-10 cm. long, 1.7-3.5 cm. wide, acute, rounded or subcordate at base, not oblique, a little crenulate or serrulate, green and densely hirsute on both sides, the hairs reddish, multicellular, the lateral veins 7-9 pairs; smaller leaf of a pair sessile, ovate, about 1 cm. long, densely hirsute; calyx 17-18 mm. long, the lobes subequal, linear, about 2.5 mm. wide near base, long-acuminate, remotely glandular-denticulate, the teeth 2 or 3 on each side, red-hirsute on both sides; corollas red, 60-75 mm. long, a little spurred at base, the tube 4 mm. in diameter above base, gradually enlarged upwardly, sparsely eglandular-pilose externally, glandular within, the throat 8-9 mm. wide, the limb strongly bilabiate, pilosulous within, the galea 23-25 mm. long, 14 mm. wide, truncate at apex, the lateral lobes long-connate with galea, the free parts 6 mm. long, the lower lobe reflexed, linear-oblong, ca. 13 mm. long and 3 mm. wide; filaments glandular near base, glabrous upwardly; anthers connate, exserted, about 2 mm. long and 1 mm. wide; ovary white-pilose; style densely glandular-pilosulous; stigma bilobed.

TYPE: La Valle de Antón, Prov. of Coclé, Panama, Allen 2288.

RANGE: Known only from the province of Coclé, Panama, at elevations from 400 to 1000 meters.

COCLE: El Valle de Antón, Allen 2279, 2311, 2348, 2882; Dressler (cult. BH, no. G886, MTJB, no. 2203-65), La Pintada, Hunter & Allen 553. 40. *Columnnea citrina* Morton, Ann. Mo. Bot. Gard. 29: 44. 1942.

Plants terrestrial, the stems ca. 0.6 m. long, not branched, about 9 mm. in diameter at base, 3 mm. in diameter at apex, strigose toward apex; leaves of a pair strongly unequal; larger leaf-blades oblong-linear, falcate, sessile, auriculate at lower base and semiamplexicaul, 20-25 cm. long, 5 cm. wide, long-acuminate, succulent, green and glabrous above, paler and substrigose beneath, bearing a red spot 8 mm long about 6 cm. below apex, the lateral veins 8-10 pairs; smaller leaf of a pair stipule-like, sessile, linear-lanceolate, about 2 cm. long and 5 mm. wide, long-acuminate, strongly oblique at base, flowers geminate, bracteate, the bracts yellow, linear-lanceolate, about 1.5 cm. long and 5 mm. wide, long-acuminate, strigose without, glabrous within; peduncles thick, 1-1.5 cm. long, densely strigose; calyx pale greenish-yellow, 30-45 mm. long in flower, the lobes equal, ovate-lanceolate, ca. 12 mm. wide, sharply long-acuminate, coarsely dentate, substrigose externally, glabrous within except on the midrib; corollas bright yellow, lined within with red-brown, 47-60 mm. long, a little spurred at base, the tube 5-6 mm. in diameter above base, ventricose upwardly, not contracted in throat, strongly hirsute externally or glabrate, the limb strongly bilabiate, glabrous within, the galea 25-35 mm. long, strongly bilobed (7 mm.), the lateral lobes long-connate with galea, the free parts about 12 mm. long, the lower lobe reflexed, linear-oblong, 18 mm. long and 5 mm. wide; filaments glabrous; anthers exerted, 3 mm. long and 2.5 mm. wide; staminodium subulate, 3 mm. long; ovary densely white-sericeous; style glabrous; stigma stomatomorphic.

TYPE: Cerro Campana, Prov. of Panama, Panama, ca. 1000 m., Allen 2404.

RANGE: Known only from Panama, on rocks at elevations of about 1000 meters.

COCLE: Hills north of El Valle de Antón, Dressler 2950.

41. *Columnnea rubra* Morton, Ann. Mo. Bot. Gard. 29: 52. 1942.

Plants epiphytic, the stems scarcely branched, strigose, soon glabrous; leaves of a pair unequal, the larger short-petiolate; petioles about 2 mm. long, very thick, about 4 mm. in diameter; leaf-blades narrowly oblong or oblanceolate, up to 14 cm. long and 4.7 cm. wide, acute, rounded and subequal at base, succulent, entire, pale green and glabrous above, strigose and red all over beneath, the midrib strongly thickened, the lateral veins about 8 pairs; smaller leaf of a pair soon deciduous, not seen; flowers paired, bracteate, the bracts linear-lanceolate, about 5 mm. long, entire, red-strigose externally; peduncles ca. 10 mm. long, densely red-strigose; calyx red, ca. 19 mm. long and lobes equal, linear-lanceolate, ca. 5 mm. wide near base, sharply long-acuminate,

densely red-strigose on both sides, remotely glandular-serrate, the teeth about 4 on each side; corollas yellow, 60-65 mm. long, a little spurred at base, the tube 2 mm. wide above base, gradually enlarged upwardly but not ventricose, becoming 7 mm. wide in throat, pilose externally, the hairs few-celled, capitate-glandular, the limb bilabiate, the galea 25 mm. long, 7 mm. wide, entire, apiculate, the lateral lobes long-connate with galea, the free parts 7 mm. long, the lower lobe reflexed, linear, 14 mm. long, 4 mm. wide, all lobes glandular-pilosulous on both sides; filaments glabrous; anthers connate, oblong, 2.2 mm. long, 1.6 mm. wide; ovary cylindric, sericeous; style glandular-pilosulous; stigma bilobed, glandular-pilosulous.

TYPE: El Valle de Antón, Prov. of Coclé, Panama, Allen 2469.

RANGE: Known only from El Valle de Antón, at elevations of about 1000 meters.

COCLE: El Valle de Antón, Allen 3411, 4183.

BOOK REVIEWS

Alma L. Moldenke

"MANUAL OF THE VASCULAR PLANTS OF TEXAS" by Donovan S. Corell and Marshall C. Johnston and collaborators, xv & 1881 pp., illus., Texas Research Foundation, Renner, Texas 75079. 1970. \$30.

Built upon a fine start in Lundell's "Flora of Texas" and continued in the same careful vein, this excellent systematic study will prove exceedingly useful. Everything about Texas is huge and so is this book. Illustrations are limited to county and vegetational state maps and a colored frontispiece of the state flower, the bluebonnet of Texas. Limitations set by the single volume size preclude any geographic distribution maps and floral drawings; the information is there in print. Space has been found for a good glossary, list of abbreviations including authors' names, and index.

"HERBALS — THEIR ORIGIN AND EVOLUTION" A Chapter in the History of Botany 1470—1670, by Agnes Arber, xxiv & 326 pp., illus., facsimile of the 1938 second edition, Hafner Publishing Co., Darien, Connecticut 06820 & New York, N. Y. 10022. 1970. \$12.95.

The first edition of 1912 was a gem; the second edition of 26 years later is a bigger and brighter gem. This offset copy makes possible the needed restocking of library shelves with a book which, like a gem, does not lose its value in aging.

The history of the printed herbals got its start somehow "in the thoughts of ancient Greece.....and it can be followed linearly to our own day." Throughout it has been shown "that botany rose from being a mere handmaid of medicine to a position of comparative independence."

The book is very carefully indexed and has 131 clear and very interesting figures or plates.

"SINCE SILENT SPRING" by Frank Graham, Jr., xvi & 333 pp., Houghton Mifflin Co., Boston, Mass. 02107. 1970. \$6.95.

Eight years have passed since Rachel Carson's carefully documented story of the effects of uncontrolled, nondegradable, general pesticide pollution on our environment was offered to the public and since the vitriolic attacks upon it made mainly by the agrico-chemical industries. Without the compelling readability of this talented author but with the full appreciation of her efforts and kindred ones of others this conservationist-author shows how Miss Carson has been completely vindicated, how snidely much of her opposition reacted, what small progress has been made, and what a great deal more — even with our present knowledge —

can be made.

Important appendices add much to this worthwhile book. The first includes an article from the Audubon's "Atlantic Naturalist" entitled "Safer Pesticides for Home and Garden" by Shirley A. Briggs. The second, by Harold G. Alford, gives the "Federal Registration Requirements for Pesticide Products". The third, "In Memoriam", tells of the Rachel Carson Trust for the Living Environment in Washington, D. C., of the Rachel Carson Memorial Fund administered by the National Audubon Society, of how we may help through them, and of how Rachel Carson left legacies to the Sierra Club and to the Nature Conservancy, establishing the Rachel Carson Seacoast Fund for the preservation of natural areas along the New England coast.

"THEORIES ON THE NATURE OF LIFE" by Giovanni Blandino, S. J., xiii & 374 pp., illus., Philosophical Library, New York, N. Y. 10016. 1969. \$6.00.

This book is the English translation by O. C. Olsoufieff of the emended first Italian edition. In it the author expounds and evaluates the following theories: determinism and anti-casualism, mechanism, vitalism, dialectical materialism, cybernetics, mnemonism, emergentism, holism and panpsychism. He presents these concepts mainly through quotations from the major proponents of each, such as Claude Bernard, Ludwig von Bertalanffy, Hans Dreisch, John S. Haldane, Julian S. Huxley, Jacques Loeb, Joseph Needham, Aleksandr I. Ceparin and George G. Simpson.

After elaborating upon what he and/or biologists generally consider inadequacies and errors in these concepts, the author presents his own ideas. He accepts the principle of invariableness of probabilities and the principle of impossibility. Applied to the "average chance universe the formation of a highly regular structure is possible, though greatly improbable....and the realization of a living body is simply impossible,...the existence of every living body requires preferential laws: preferential laws are the fundamental causes of life, [and] therefore also of evolution." After elaborating upon the Hardy-Weinberg law, he concludes that "probably the principal directional factor of evolution has been the differential vitality or selection." Each is a different possible modality of the oriented causes. "My position is therefore essentially anti-causalistic, not anti-selectionistic. In my opinion the 'formula' of the causes of evolution is not chance and selection, but preferential laws and selection."

English is probably not the "first" language of the translator.

"OUR PRECARIOUS HABITAT" by Melvina A. Benarde, 362 pp., illus., W. W. Norton & Co., New York, N. Y. 10003. 1970. \$2.95 paper bound.

This book is an outgrowth of a course in environmental health

problems taught by the author for non-biologists. It will well serve a wider audience of interested citizenry who wish to be well informed on this very important topic.

The author fortifies with practical information and reasoning his belief that optimum solutions to community pollution problems must be developed through an integrated or systems approach. He considers food diseases, insecticides, zoonoses, sewage, water and air pollution, accidents and occupational hazards, noise, ionizing radiation, biological and chemical warfare, and finally the politics of pollution. He does not seem to be concerned especially with the problem of the numerically expanding human population.

The author's intent "will have been achieved if the presentation enables the intelligent reader to evaluate these problems from a basis of knowledge and understanding, rather than of emotional fervor founded on ignorance, superstition, and prejudice." This reviewer wishes him many readers for the sake of "our precarious habitat".

Bibliographic material is arranged according to the chapter topics.

There is a useful index.

"THE TRANSPORT OF PLANT HORMONES" — Proceedings of the NATO/Ege University Summer Institute, October 1967 — edited by Y. Vardar, viii & 457 pp., illus., North-Holland Publishing Co., Amsterdam & John Wiley & Sons, Inc. as their Western Hemisphere distributor, New York, N. Y. 10016. 1968. \$23.00

The 26 papers and their valuable discussions present what is known today and outline the research and re-evaluations needed tomorrow. Kaldewey's opening address analyzes polar transportation in terms of "density", "velocity" and "intensity" rate rather than just "rate". Other authors deal with the movement of ^{14}C -marked indolyl acetic acid; auxin and kinin relationship with senescence; acropetal movement of auxin and agents modifying its longitudinal transport; effects of photosynthesis, tropisms, symbiosis, flowering and bud dormancy. Alleweltdt considers "the annual cyclic pattern of growth and dormancy as the result of a complex competition of operators controlled by external conditions in combination with an endogenous mechanism of plant development, that is, a hormonal influence on the mechanisms by which the information contained in the genetic code of DNA is transferred to the corresponding mRNA, this giving rise to the synthesis of specific enzymes."

Some proofreader was lax because oxidation is spelled two ways on p. 154, while continuum on p. 366, German on p. 4, Cichorium intybus on p. 415 are also misspelled.

The index is scanty, omitting all plant names.

This is a valuable book, but also an unreasonably expensive one.

"AUSTRALIAN NATIVE ORCHIDS IN COLOUR" by Leo Cady & E. R. Rotherham, 112 pp., illus., Charles E. Tuttle Co., Rutland, Vermont 05701 & Tokyo, Japan. 1971. \$6.75.

This book is a little beauty at a very reasonable price considering the inclusion of over 100 beautiful color photographic prints. The text by the first author, who has been specializing in orchids for over a score of years, consists of interesting succinct descriptions, pollination information so fascinating in this family, habitat and geographic distribution notes, scientific and common names with their derivations, and type specimen records. The illustrations by the second author, who is a renowned natural history photographer, combine very effectively correct representation, exquisite detail and artistic grace.

The following items are only of minor significance: lithophytes are confused with lithophiles (p. 7), dependence is misspelled (p. 7), "Geodorum" is derived from "being near the earth" [that is, the flower] instead of "gift of the earth" (p. 92), and magnifications are not given with the illustrations.

Anyone interested in orchids, anyone interested in Australia — in fact, just anyone at all — should enjoy this book!

"THE LYNN INDEX — A BIBLIOGRAPHY FOR PHYTOCHEMISTRY" Monograph VI, Order Tubiflorae, edited by Norman R. Farnsworth, Ralph B. Blomster, Maynard W. Quimby & John W. Schermerhorn, 274 pp., published privately by Dr. N. R. Farnsworth, Dept. of Pharmacognosy & Pharmacology, University of Illinois, Chicago, Illinois 60612. 1969. \$5 paperback.

A valuable service has been rendered by these scientists for taxonomic botanists, pharmaceutical workers and students, and many others in collating all this material. The first five monographs were edited by the last two individuals mentioned above and were published by the Massachusetts College of Pharmacy. All are built on Dr. Eldin V. Lynn's file of triple entries kept by him for many years (generic, author, chemical) and have been added to constantly.

Material is arranged by related and briefly described plant families and alphabetically by genera and the species within them. After each species the common names, common synonymy, and the chemicals involved are listed. Numbers after each chemical refer to the bibliography given at the end of each plant family.

"THE BIOLOGY OF FUNGI, BACTERIA AND VIRUSES", 2nd edition, by Greta B. Stevenson, xiii & 202 pp., illus., American Elsevier Publishing Company, New York, N. Y. 10017. 1970. \$9.00

"Intended for students in the early parts of their University courses in Botany and Biology and also for sixth-form pupils", this book may serve well as a library reference for students in the United States rather than as a text because there are avail-

able more "attractive" works for our students. Part I deals with cell organization, metabolism, growth and development. Part II discusses habitat interrelations and such economic microbiological processes as are used in the fermentation industries, antibiotic production, etc. Part III develops the diversity of fungi in relation to their environments in systematic order.

There is an appendix with classification, a useful bibliography and an index.

"THE BIOLOGY OF LICHENS" by Mason E. Hale, Jr., viii & 176 pp., illus., American Elsevier Publishing Co., New York, N. Y. 10017. 1970. \$7.50.

This excellent highly readable work was first published by Edward Arnold, Ltd., of London in 1967. It makes a fine companion volume to the author's "Lichen Handbook" of 1961, thus supplementing this field guide with basic modern biological theory and information. It belongs in the libraries of all kinds of biologists, all schools and scientifically interested general readers.

It covers the following topics: morphology of the thallus and its ascomycete or basidiomycete reproductive structures and vegetative diaspores, physiology and nutrition, symbiosis and synthesis, growth and longevity, succession in ecologically different communities, intra- and extra-cellular chemistry and biochemical systematics, classification and taxonomy, and finally economic importance. This thin book has 289 important bibliographic references, a useful index, and excellent photos and drawings.

How does the author delimit lichens? "Lichens are undeniably more than a sum of their [fungal and algal] parts, for lichenization is accompanied by structural modifications (e.g., thalloid exciple, soredia) new to the plant kingdom and physiological activities (production of lichen acids) different from those of either component."

"FLORA ANALÍTICA E FITOGEOGRÁFICA DO ESTADO DO SÃO PAULO" Volume 2 by João Angely, xix--xliii & 241--456 & 17 pp., illus., Edições Phytton, C.P. 5271, São Paulo, Brazil. 1970.

Welcome to this new volume in a very carefully executed serial publication from a most prodigious botanical worker! It covers 31 families from the Leguminosae through the Vitaceae with 240 genera and 1345 species and their subunits. For each taxon is given the source of its scientific name, a brief description, blooming times, common names, synonymy, and geographic distribution.

There are 399 distribution maps covering the range of the recorded plants throughout the Western Hemisphere. There are several valuable indexes. The offset printing is very neat; only the generic name Rhabdocaulon on p. xxxiv was noticed as misspelled.

PHYTOLOGIA

Designed to expedite botanical publication

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
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SOME NEW DISCOMYCETE NAMES

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*Plant Pathology Herbarium
Cornell University, Ithaca, New York*

Preparation of keys to the Discomycete genera (Korf, 1971) has led to several revisions by the author and his students, most of which are being reported elsewhere. This brief article involves validation of three new genera and forty-three new combinations in various Discomycete groups not currently being monographed by us.

NEW GENERA

CALLORINA Korf, *gen. nov.*

Apothecia subgelatinosa, erumpentia, denique patelliformia, carnea vel aurantiaca, hymenio concolore; excipulum ex textura angulari formatum, parietibus tenuibus, subhyalinibus; asci J-; ascosporae ellipticae-cylindricae, 1- vel 3-septatae, hyalinae; paraphyses filiformes, apice tumido. (Helotiales, Dermateaceae, Naevieae.) Species typica: *Peziza fusarioides* Berk.
(= *Calloria* Fr. sensu Tul. et Tul., non Fries.)

DENCOELIOPSIS Korf, *gen. nov.*

Apothecia coriacea, erumpentia, cupulata, breviter stipitata, rufo-fusca, pulverulenta vel furfuracea, hymenio flavido, in sicco nigrescente; excipulum ectale exterius ex cellulis globosis incohaerentibus et hyphis capilliformibus mixtis formatum; excipulum ectale interius ex textura porrecta formatum, parietibus luteis vel brunneis, granulatis; asci J+; ascosporae fusiformae, 1-septatae, hyalinae; paraphyses filiformes. (Helotiales, Leotiaceae, Encoelioideae.) Species typica: *Peziza johnstonii* Berk.
(= *Encoeliopsis* Nannf. sensu Dennis, non Nannfeldt.)

VELUTARINA Korf, *gen. nov.*

Apothecia coriacea, sessilia, cupulata, ferrugineo-brunnea, pulverulenta, hymenio viridulo vel nigro; cellulae vesiculosae pigmentum viridulum in excipulo disperso continentes; asci J+; ascosporae ellipticae, non septatae, hyalinae vel pallide brunneae, 1- vel 2-guttulatae; paraphyses cylindricae, apice clavato pigmentum olivaceum continente. (Helotiales, Leotiaceae, Encoelioideae.) Species typica: *Peziza rufo-olivacea* Alb. et Schw. ex Pers.
[= *Velutarina* Korf, *Mycologia* 45: 476. 1953, not validly published (Int. Code Botan. Nomencl. 1966, Art. 36).]

NEW COMBINATIONS

- Aparaphysaria aparaphysata* (Speg.) Korf, *comb. nov.*
= *Geopyxis aparaphysata* Speg., *Anales Mus. Nac. Buenos Aires* 6: 302. 1898.
= *Aparaphysaria doelloi* Speg. 1922.
- Ascocoryne cylichnium* (Tul.) Korf, *comb. nov.*
= *Peziza cylichnium* Tul., *Ann. Sci. Nat., Bot.* III 20: 174. 1853.
= *Coryne cylichnium* (Tul.) Boud. 1907.
= *Coryne urnalis* (Nyl.) Sacc. 1875.
- Ascocoryne microspora* (Ellis et Everh.) Korf, *comb. nov.*
= *Coryne microspora* Ellis et Everh., *Bull. Torrey Bot. Club* 24: 282. 1897.
- Ascocoryne turficola* (Boud.) Korf, *comb. nov.*
= *Coryne turficola* Boud., *Bull. Soc. Mycol. France* 21: 71. 1905.
- Blumeriella kerriae* (Stewart) Korf, *comb. nov.*
= *Coccomyces kerriae* Stewart, *Phytopathology* 7: 405. 1917.
= *Higginsia kerriae* (Stewart) Nannf. 1932.
- Boedijnopeziza colensoi* (Berk.) Korf et Erb, *comb. nov.*
= *Peziza colensoi* Berk. in Hooker, *Botany Antarctic Voyage* 2(2): 200. 1855.
= *Cookeina colensoi* (Berk.) Seaver 1913.
- Byssonectria aggregata* (Berk. et Br.) Rogerson et Korf, *comb. nov.*
= *Peziza aggregata* Berk. et Br., *Ann. Mag. Nat. Hist.* III 18: 123. 1866.
= *Octospora aggregata* (Berk. et Br.) Eckblad 1968.
= *Inermisia aggregata* (Berk. et Br.) Svrček 1969.
- Byssonectria fusispora* (Berk.) Rogerson et Korf, *comb. nov.*
= *Peziza fusispora* Berk., *Lond. J. Botany* 5: 5. 1846.
= *Octospora fusispora* (Berk.) Brumm. 1967.
= *Inermisia fusispora* (Berk.) Rifai 1968.
- Byssonectria tetraspora* (Fuckel) Korf, *comb. nov.*
= *Ascobolus tetrasporus* Fuckel, *Hedwigia* 5: 4. 1866.
= *Octospora tetraspora* (Fuckel) Korf 1955.

Callorina fusarioides (Berk.) Korf, *comb. nov.*

≡ *Peziza fusarioides* Berk., Mag. Zool. Bot. 1: 46. 1837.

≡ *Calloria fusarioides* (Berk.) Fr. 1849.

Ciboria peckiana (Cooke) Korf, *comb. nov.*

≡ *Helotium macrosporum* Peck, Ann. Rept. N. Y. S. Mus. 26: 82.

1874, non *Peziza macrospora* Wallr. 1833, nec *Ciboria macrospora* (Sacc.) Sacc. 1883.

≡ *Peziza peckiana* Cooke, Bull. Buff. Soc. Nat. Sci. 2: 294. 1875, *nom. nov.*

≡ *Rutstroemia macrospora* (Peck) Kanouse in Wehmeyer 1940.

Ciboria peckiana forma gigaspora (Korf) Korf, *comb. nov.*

≡ *Rutstroemia macrospora* (Peck) Kanouse in Wehm. f. *gigaspora* Korf, Bull. Nat. Sci. Mus. (Tokyo) 4: 396. 1959.

Cordierites frondosa (Kobayasi) Korf, *comb. nov.*

≡ *Bulgaria frondosa* Kobayasi, Bot. Mag. (Tokyo) 53: 158. 1939.

≡ *Ionomidotis frondosa* (Kobayasi) Kobayasi et Korf in Korf 1958.

Cyathicula cyathoidea (Bull. ex Mérat) Korf, *comb. nov.*

≡ *Peziza cyathoidea* Bull. ex Mérat, Nouv. Flore Envir. Paris, ed. 2, 1: 23. 1821. : Fr. 1822.

≡ *Phialea cyathoidea* (Bull. ex Mérat) Gill. 1881.

≡ *Cyathicula vulgaris* de Not. 1864, *nom. nov. superf.*

Cyathicula helios (Penzig et Sacc.) Korf, *comb. nov.*

≡ *Davincia helios* Penzig et Sacc., Malpighia 15: 215. 1902; Icones Fung. Javan. p. 81. 1904.

Cyathicula sublicoides (Karst.) Korf, *comb. nov.*

≡ *Peziza sublicoides* Karst., Not. Sällsk. Fauna Flora Fenn. 10: 148. 1869.

≡ *Allophylaria sublicoides* (Karst.) Nannf. 1932.

Dencoeliopsis johnstonii (Berk.) Korf, *comb. nov.*

≡ *Peziza johnstonii* Berk., Ann. Mag. Nat. Hist. I 13: 356. 1844.

≡ *Encoeliopsis johnstonii* (Berk.) Dennis 1956.

Fimaria ripensis (E. C. Hansen) Korf, *comb. nov.*

≡ *Peziza ripensis* E. C. Hansen, Hedwigia 15: 97. 1876; Vidensk. Meddel. Naturh. Foren. Kjöbenh. 1876: 267. 1876.

Grovesiella ericae (Fr.) Korf, *comb. nov.*

≡ *Cenangium ericae* Fr., Syst. Myc. 2: 188. 1822.

≡ *Encoeliopsis ericae* (Fr.) Groves 1969.

Grovesiella ledi (Alb. et Schw. ex Pers.) Korf, *comb. nov.*

≡ *Peziza ledi* Alb. et Schw. ex Pers., Myc. Eur. 1: 324. 1822. :
Fr. 1822.

≡ *Encoeliopsis ledi* (Alb. et Schw. ex Pers.) Groves 1969.

Laetinaevia caulophylli (Ellis et Everh.) Korf, *comb. nov.*

≡ *Orbilbia caulophylli* Ellis et Everh., Proc. Acad. Nat. Sci.,
Philadel. 1893: 145. 1893.

Melastiza flavorubens (Rehm in Rabenh.) Pfister et Korf,
comb. nov.

≡ *Humaria flavorubens* Rehm in Rabenh., Kryptogamen-Flora Deutschl.,
Oesterr. Schweiz II 1(3) [42]: 960. 1894.

= *Melastiza greletii* Le Gal 1958.

Neocudoniella albiceps (Peck) Korf, *comb. nov.*

≡ *Ombrophila albiceps* Peck, Ann. Rept. N. Y. S. Mus. 42: 130.
1889.

≡ *Leotia albiceps* (Peck) Mains 1956.

= *Neocudoniella jezoensis* Imai 1941.

Neolecta irregularis (Peck) Korf et J. K. Rogers, *comb. nov.*

≡ *Geoglossum irregulare* Peck, Ann. Rept. N. Y. S. Mus. 32: 45.
1879.

≡ *Mitrlula vitellina* (Bres.) Sacc. in Sacc. et Bres. subsp.
irregularis (Peck) Sacc. 1889.

≡ *Mitrlula irregularis* (Peck) Durand 1908.

≡ *Ascocoryneum irregulare* (Peck) Ito et Imai in Imai 1934.

≡ *Spragueola irregularis* (Peck) Nannf. 1942.

= *Spragueola americana* Massee 1896.

Neolecta vitellina (Bres.) Korf et J. K. Rogers, *comb. nov.*

≡ *Geoglossum vitellinum* Bres., Rev. Mycol. 4: 212. 1882.

≡ *Mitrlula vitellina* (Bres.) Sacc. in Sacc. et Bres. 1885.

≡ *Ascocoryneum vitellinum* (Bres.) Ito et Imai in Imai 1934.

≡ *Spragueola vitellina* (Bres.) Nannf. 1942.

Pezoloma ciliifera (Karst.) Korf, *comb. nov.*

- ≡ *Peziza ciliifera* Karst., Not. Sällsk. Fauna Flora Fenn. 10: 153. 1869.
- ≡ *Sphagnicola ciliifera* (Karst.) Vel. 1934.
- ≡ *Pseudodiscinella ciliifera* (Karst.) Dennis 1956.
- = *Lachnea ciliata* Vel. 1922, monotype of genus *Ciliatula* Vel. 1922.

Pezoloma fergussonii (Sacc.) Korf, *comb. nov.*

- ≡ *Helotium melleum* Berk. et Br., Ann. Mag. Nat. Hist. IV 15: 38. 1875, non *H. melleum* Berk. et Br. 1873.
- ≡ *Helotium fergussonii* Sacc., Syll. Fung. 8: 223. 1889, *nom. nov.*
- ≡ *Sphagnicola fergussonii* (Sacc.) Dennis 1964.

Pezoloma iodocyaneus (Dennis et Korf) Korf, *comb. nov.*

- ≡ *Sphagnicola iodocyaneus* Dennis et Korf, Kew Bull. 1958: 181. 1958.

Pezoloma laricina (Ellis et Everh.) Korf, *comb. nov.*

- ≡ *Pseudohelotium laricinum* Ellis et Everh., Proc. Acad. Nat. Sci., Philadel. 1894: 349. 1894.
- ≡ *Sphagnicola laricina* (Ellis et Everh.) Dennis 1964.

Pezoloma obstricta (Karst.) Korf, *comb. nov.*

- ≡ *Peziza obstricta* Karst., Not. Sällsk. Fauna Flora Fenn. 10: 151. 1869.
- ≡ *Pseudodiscinella obstricta* (Karst.) Dennis 1956.
- ≡ *Sphagnicola obstricta* (Karst.) Dennis et Korf 1958.

Phaeosclerotinia phaeospora (Hori) Korf, *comb. nov.*

- ≡ *Sclerotinia phaeospora* Hori, Engi no Tomo 8: 953. 1912.
- ≡ *Phaeosclerotinia nipponica* Hori in Sasaki ("Phaeosclerotinia"), Nippon Engi Zasshi 25: 38. [15. Mar.] 1913; (*Phaeosclerotinia*) Engi no Tomo 9: 351. [5 Apr.] 1913, *nom. nov. superfl.*

Pulparia persoonii (Crouan et Crouan) Korf, Pfister et Rogers, *comb. nov.*

- ≡ *Ascobolus persoonii* Crouan et Crouan, Fl. Finestère p. 56. 1867, (lectotypified by Brummelen 1967).
- ≡ *Marcelleina persoonii* (Crouan et Crouan) Brumm. 1967.

- Pulparia planchonis* (Dun. ex Boud.) Korf, Pfister et Rogers, *comb. nov.*
= *Plicaria planchonis* (Dun.) ex Boud., Bull. Soc. Mycol. France 3: 92. 1887.
= *Marcelleina atroviolacea* Brumm. 1967.
= *Peziza atroviolacea* Delile ex de Seynes 1886, non *Peziza atroviolacea* Bres. 1882.
- Pulparia planchonis* forma *ovalispora* (Grelet) Korf, Pfister et Rogers, *comb. nov.*
= *Plicaria planchonis* (Dun.) ex Boud. var. *ovalispora* Grelet, Bull. Soc. Mycol. France 42: 203. 1927.
- Sarcoleotia globosa* (Sommerf.) Korf, *comb. nov.*
= *Mitruia globosa* Sommerf., Suppl. Fl. Lappl. p. 287. 1826.
= *Corynetes globosus* (Sommerf.) Durand 1908.
- Sowerbyella imperialis* (Peck) Korf, *comb. nov.*
= *Peziza imperialis* Peck, Ann. Rept. N. Y. S. Mus. 29: 54. 1878, non *P. imperialis* Beck 1884.
= *Aleuria unicolor* Gill., Champ. Fr., Discom. p. 38. 1880.
= *Sowerbyella unicolor* (Gill.) Nannf. 1938.
= *Pseudotis unicolor* (Gill.) Heim 1962.
- Tarzettia bronca* (Peck) Korf et J. K. Rogers, *comb. nov.*
= *Peziza bronca* Peck, Ann. Rept. N. Y. S. Mus. 29: 54. 1878.
= *Pustularia bronca* (Peck) Kanouse 1950.
= *Pustulina bronca* (Peck) Korf et Berthet in Berthet et Korf 1969.
- Tarzettia catinus* (Holmskj. ex Pers.) Korf et J. K. Rogers, *comb. nov.*
= *Peziza catinus* Holmskj. ex Pers., Myc. Eur. 1: 231. 1822. : Fr. 1822.
= *Pustularia catinus* (Holmskj. ex Pers.) Fuckel 1870.
= *Pustulina catinus* (Holmskj. ex Pers.) Eckblad 1968.
= *Peziza tarzettia* Cooke, Mycographia p. 166. 1877; nomenclatural type of *Peziza* subgen. *Tarzettia* Cooke, Mycographia p. 251. 1879 (Int. Code Botan. Nomencl. 1966, Art. 22), hence also the nomenclatural type of *Tarzettia* (Cooke) Lambotte 1887).
- Tarzettia gaillardiana* (Boud.) Korf et J. K. Rogers, *comb. nov.*
= *Pustularia gaillardiana* Boud., Bull. Soc. Mycol. France 18: 141. 1902.
= *Pustulina gaillardiana* (Boud.) Pant et Tewari 1971.

- Tarzettia insignis* (Berthet et Rioussset) Korf et J. K. Rogers, *comb. nov.*
 = *Pustularia insignis* Berthet et Rioussset, Bull. Soc. Mycol. France 79: 392, 397. 1963.
 = *Pustulina insignis* (Berthet et Rioussset) Korf et Berthet in Berthet et Korf 1969.
- Unguiculariopsis hysterigena* (Berk. et Br.) Korf, *comb. nov.*
 = *Peziza hysterigena* Berk. et Br., J. Linn. Soc. (London) 14: 106. 1873.
 = *Peziza ravenelii* Berk. et Curtis in Berk. 1875.
 = *Encoeliella ravenelii* (Berk. et Curtis in Berk.) Höhn. 1910.
- Unguiculariopsis infundibuliformis* (Durand) Korf, *comb. nov.*
 = *Midotis infundibuliformis* Durand, Proc. Amer. Acad. Arts Sci. 59: 7. 1923.
- Velutarina rufo-olivacea* (Alb. et Schw. ex Pers.) Korf, *comb. nov.*
 = *Peziza rufo-olivacea* Alb. et Schw. ex Pers., Myc. Eur. 1: 251. 1822. : Fr. 1822.
 = *Velutaria rufo-olivacea* (Alb. et Schw. ex Pers.) Fuckel 1870.
 [= *Velutarina rufo-olivacea* (Alb. et Schw. ex Pers.) Korf 1953, not validly published (Int. Code Botan. Nomencl. 1966, Art. 43).]

ACKNOWLEDGMENTS

This work has been supported by National Science Foundation Grant GB-8548, "*Monographic and Floristic Studies of the Discomycetes*." The able technical assistance of Mrs. Patricia Fazio allowed these studies to be completed. Most of all I owe a very deep debt to my many students, present and past, whose unfailing and friendly help, criticism, and forbearance can never be repaid. Throughout much of the work, a motto coined by one of my students (Joanne K. Rogers, *in litt.*) has helped me through some of the more difficult times: "*No name change today can eradicate the confusion of the past!*"

LITERATURE CITED

- Korf, R. P. (1971). Discomycetes and Tuberales. In "The Fungi: An Advanced Treatise," (G. C. Ainsworth, A. S. Sussman and F. K. Sparrow, eds.), Volume IV. Academic Press, New York & London.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XV

Harold N. Moldenke

CALLICARPA LONGIPES Dunn

Additional bibliography: Moldenke, *Phytologia* 21: 162—164. 1971.

Additional citations: CHINA: Fukien: Ching 6668 (N); H. H. Chung 3370 (Ca—288415, Ca—420338, V—4164; Hongkong Herb. 3390 (N—photo of isotype). Kiangsi: Tsiang 10159 (N). Kwangsi: Ching 7189 (N); Wing 5681 (N). Kwangtung: Liou 884 (N); Peng, Tak, & Kin 561 [Herb. Canton Chr. Coll. 12560] (Ca—274993, W—1248186); Sin 10020 (N); Tsang 20762 (N), 21319 (N); Tso 20752 (N). Kweichow: Chaffanjon 2341 (N—photo, N—photo).

CALLICARPA LONGIPES var. LAUI Moldenke, *Phytologia* 8: 273. 1962.

Bibliography: Moldenke, *Phytologia* 8: 273. 1962; Moldenke, *Résumé Suppl.* 4: 8. 1962; Moldenke, *Biol. Abstr.* 39: 614. 1962; Hocking, *Excerpt. Bot. A.6*: 535. 1963.

This variety differs from the typical form of the species in having its pubescence on the petioles, leaf-blades, branches, peduncles, inflorescence-branches, pedicels, and calyx hirsute, elongate, divergent at right angles to the base, and gland-tipped.

The type of the variety was collected by S. K. Lau (no. 3927) — in whose honor it is named — at Sai Hang Cheung, near Tung Lei village, Kiennan District, Kiangsi, China, between July 28 and 30, 1934, and is deposited in the United States National Herbarium at Washington.

In all, 3 herbarium specimens, including the type, have been examined by me.

Citations: CHINA: Kiangsi: Lau 3927 (W—1752680—type), 4729 (W—1753357, 2).

CALLICARPA LONGIPETIOLATA Merr., Philip. Gov. Lab. Bur. Bull. 29: 47. 1905.

Synonymy: Callicarpa tomentosa var. longipetiolata (Merr.) Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 22. 1921.

Bibliography: E. D. Merr., Philip. Gov. Lab. Bur. Bull. 29: 47—48 & 58. 1905; Prain, Ind. Kew. Suppl. 3: 32. 1908; H. J. Lam, *Verbenac. Malay. Arch.* 49, 75—76, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 21, 22, & 221. 1921; E. D. Merr., *Enum. Philip. Pl.* 3: 386. 1923; Moldenke, *Prelim. Alph. List Invalid Names* 13. 1940; Moldenke, *Alph. List Invalid Names* 11. 1942; Moldenke, *Known Geogr. Distrib. Verbenac.*, ed. 1, 62 & 87. 1942; Moldenke, *Alph. List Invalid Names Suppl.* 1: 3. 1947; Moldenke, *Known Geogr. Distrib. Verbenac.*, ed. 2, 140 & 177. 1949; Moldenke, *Alph. List Cit.* 4: 1085, 1236, & 1260. 1949; Moldenke, *Biol. Abstr.* 26: 1471. 1952; Moldenke, *Phytologia* 4: 77. 1952; Moldenke, *Résumé* 182, 245, 247, & 444. 1959; Molden-

ke, Phytologia 13: 499. 1966; Moldenke, Résumé Suppl. 16: 18. 1968.

Tree, to 15 m. tall; trunk to 31 cm. in diameter; branchlets subtetragonal, ferruginous-tomentose or -subtomentose; leaves decussate-opposite; petioles 1.7–2.6 cm. long, ferruginous-tomentose or -subtomentose; leaf-blades coriaceous or thick-chartaceous, ovate or oblong-ovate, 4–10 cm. long, 1.5–4.5 cm. wide, acute or acuminate at the apex, entire, somewhat rounded to subacute or acute at the base, stellate-hairy above when young but glabrous when adult, densely yellow-brown-tomentose beneath or subpersistently flavid-puberulent when dried; secondaries 7–9 pairs; cymes small to medium or large, in the axils of the upper leaves, 7–10 cm. long, 5.5–10 cm. wide, ferruginous-tomentose or -subtomentose; peduncles 4–5.5 cm. long, 2–3 times as long as the subtending petiole; flowers subsessile; calyx 1 mm. long, densely pilose with yellowish stellate-furfuraceous hairs, glandulose, the rim 4-toothed; corolla 3 mm. long, with 4 lines of dense simple (?) hairs, glandulose, or very densely sublanate-tomentose on the outside and on the back of the lobes, the lobes glabrous within; stamens 3.5–4.5 mm. long; anthers glandulose; style 4 mm. long; stigma capitate; ovary densely villous and glandular-punctate.

The type of this species was collected by Adolph Daniel Edward Elmer (no. 6266) on Mount Santo Tomas, in the province of Benguet, Luzon, Philippine Islands, in May of 1904, and was deposited in the herbarium of the Bureau of Science at Manila, but is now destroyed. Collectors have found this species in bloom from February to June. A black fungus is on specimens of M. S. Clemens 5882. The Vanoverbergh 1376, distributed as C. longipetiolata, is actually the type collection of its var. glabrescens Moldenke.

In all, 19 herbarium specimens, including type material of both names involved, and 2 mounted photographs have been examined by me.

Citations: PHILIPPINE ISLANDS: Luzon: M. S. Clemens 5882 (Ca—252509, Z), 9185 (Bi); Elmer 6266 (Bz—18681—isotype, N—isotype, N—photo of isotype, Z—photo of isotype), 14280 (Bi, Bz—18682, Du—176387, N, Ut—33520, Vi, W—1051134); E. D. Merrill 873 (Ut—23202, W—1133077); Sandkuhl s.n. [Herb. Philip. Forest Bur. 20428] (W—900688); J. K. Santos s.n. [Herb. Philip. Bur. Sci. 31935] (Ca—214050, N, W—1262967); J. V. Santos 5810 (W—2246767).

CALLICARPA LONGIPETIOLATA var. GLABRESCENS Moldenke, Phytologia 4: 43. 1952.

Synonymy: Callicarpa longipetala Merr. ex Moldenke, Alph. List Invalid Names Suppl. 1: 3, in syn. 1947.

Bibliography: Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; Moldenke, Phytologia 4: 43 & 77. 1952; Moldenke, Biol. Abstr. 26: 1471. 1952; Moldenke, Résumé 182 & 444. 1959; Moldenke, Phytologia 13: 499. 1966; Moldenke, Résumé Suppl. 16: 18. 1968.

This variety differs from the typical form of the species in having its lower leaf-surfaces decidedly silvery, but only very sparsely furfuraceous on the larger venation when mature.

The type of the variety was collected by Father Morice Frans Jules Pieter Maria Vanoverbergh (no. 1376) in Bontoc Subprovince, Luzon, Philippine Islands, on June 30, 1914, and is deposited in the herbarium of the Botanisch Museum at Utrecht. This same collection is also the type of Merrill's C. longipetala, which I formerly (1947) regarded as typical C. longipetiolata. The plant has been collected in anthesis so far only in June. Material has been misidentified and distributed in herbaria as C. angusta Schau. and as typical C. longipetiolata Merr.

In all, 6 herbarium specimens, including type material of both names involved, and 3 mounted photographs have been examined by me.

Citations: PHILIPPINE ISLANDS: Luzon: Loher 12589 (Ca—243061); Vanoverbergh 1376 (Go—isotype, Mi—photo of isotype, N—isotype, N—photo of type, S—isotype, Ut—53633—type, Vi—isotype, Z—photo of type).

CALLICARPA LONGISSIMA (Hemsl.) Merr., Philip. Journ. Sci. Bot. 12: 108. 1917.

Synonymy: Callicarpa longifolia var. ? longissima Hemsl. in Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 253—254. 1890. Callicarpa longifolia Hance ex Hemsl. in Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 253, in syn. 1890 [not C. longifolia Auct., 1965, nor Blume, 1936, nor Diels, 1916, nor Hemsl., 1916, nor Hook., 1932, nor L., 1820, nor Lam., 1783, nor Roxb., 1827, nor Vahl, 1936, nor "sensu Hemsl.", 1949]. Callicarpa longifolia var. longissima Hemsl. apud J. Matsumura, Ind. Pl. Jap. 2 (2): 529. 1912. Callicarpa longissima Merr. apud Chung, Mem. Sci. Soc. China 1 (1): 226. 1924. Callicarpa longifolia longissima Hemsl. apud Stapf, Ind. Lond. 1: 526. 1929. Callicarpa longissima f. subglabra P'ei, Mem. Sci. Soc. China 1 (3): 50. 1932. Callicarpa taiwaniana Suzuki, Trans. Nat. Hist. Soc. Formosa 25: 130—131. 1935. Callicarpa longifolia Benth. ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962. Callicarpa longifolia sensu Mori apud Li, Woody Fl. Taiwan 823, in syn. 1963.

Bibliography: Hance, Ann. Soc. Nat., ser. 5, 5: 233. 1866; Maxim., Mém. Biol. 12: 507. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 253—254. 1890; J. Matsumura, Ind. Pl. Jap. 2 (2): 529. 1912; Hayata, Ic. Pl. Formos. 2: 125, pl. 36. 1912; Rehd. in Sarg., Pl. Wils. 3: 369. 1916; E. D. Merr., Philip. Journ. Sci. Bot. 12: 108. 1917; Nakai, Bot. Mag. Tokyo 36: 23. 1922; Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.] 60h. 1927; Stapf, Ind. Lond. 1: 526. 1929; P'ei, Sinensia 2: 68. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 17, 49—50, & 55, pl. 6. 1932; Suzuki, Trans. Nat. Hist. Soc. Formos. 25: 130—131. 1935; Dop in Lecomte, Fl. Indo-Chine 4: 802.

1935; Moldenke, in Fedde, Repert. Spec. Nov. 40: 98. 1936; Kanehira, Formos. Trees, ed. 2, 642, 644--645, & 716. 1936; Masamune, Short Fl. Formos. 179. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Prelim. Alph. List Invalid Names 11 & 12. 1940; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, & 87. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Phytologia 2: 68 & 94. 1945; Moldenke, Castanea 13: 120. 1948; Moldenke, Alph. List Cit. 2: 634 (1948), 3: 657, 666, 727, & 770 (1949), and 4: 1010, 1011, & 1228. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 131, 133, 135, & 177. 1949; Chang, Act. Phytotax. Sin. 1: 280, 285, 293, 308, 310, & 311. 1951; Moldenke, Résumé 168, 171, 174, 244, 245, & 444. 1959; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1207, pl. 1015. 1962; Moldenke, Résumé Suppl. 3: 18 & 30. 1962; Li, Woody Fl. Taiwan 819, 823, & 944. 1963; Moldenke, Résumé Suppl. 8: 3 (1964) and 14: 7. 1966; Moldenke, Phytologia 14: 55, 58, 99, 102, 104, & 171--172 (1966), 15: 38 (1967), 16: 371 & 373 (1968), 20: 490 (1971), and 21: 48, 102, 109, & 113. 1971.

Illustrations: Hayata, Ic. Pl. Formos. 2: pl. 36. 1912; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.] 604. 1927; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] pl. 6. 1932; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: pl. 1015. 1962.

Woody herb or erect bush, densely bushy shrub, or small tree, 1--10 m. tall, glabrous and shiny almost throughout; trunk to 7.5 cm. in diameter; bark gray; branches green, often with a ring of long villous hairs at the nodes; leaves decussate-opposite; petioles 0.7--1.5 cm. long; leaf-blades chartaceous, somber-green above, lighter beneath, ovate-lanceolate or elliptic-lanceolate to lanceolate or conspicuously and narrowly elongate-lanceolate, 12--23 cm. long, 2--5.5 cm. wide, entire or crenately serrate, glabrous or subglabrous to pubescent with stellate hairs above (especially along the venation), sparsely golden-pulverulent and with a few large glands beneath or glabrous; secondaries 13 or 14 per side; cymes distinctly pedunculate, the peduncles about 2 cm. long; flowers minute; calyx 1 mm. long, sparsely glandulose on the outer surface, glabrous within, its rim truncate, with 4 rudimentary teeth; corolla red or pink to purple, sometimes yellowish-white or white, sparsely pubescent and glandulose outside, its tube about 1 mm. long, glabrous, the limb 4-lobed, the lobes sparsely pubescent within; stamens exserted; filaments nearly 3 times as long as the corolla-tube; style surpassing the stamens; ovary glandulose; fruit subglobose, about 2 mm. in diameter, green when immature, white when ripe, glandulose.

Merrill (1917) comments that "The type of Hemsley's variety was from near Canton, and is the form interpreted by Hance and by Maximowicz as Callicarpa longifolia Lam. Lamarck's type was from Malacca, and Callicarpa longifolia Lam. is a species entirely distinct from this Chinese form; Hemsley states that his var. longissima stands out very distinctly from all others (i.e., other forms of Callicarpa longifolia Lam.) and should perhaps be raised to be specific rank. It is distinguished from Lamarck's species by its

narrow, elongated, nearly glabrous, entire or but very minutely toothed leaves, its smaller flowers, and other characters. In some respects it approaches the Philippine Callicarpa dolichophylla Merr., from which it is distinguished by its vegetative characters."

The C. longifolia accredited to "Auct.", to Blume, to Linnaeus, to Roxburgh, and to Vahl in the synonymy given above is C. longifolia Lam., a valid species, that accredited to Diels is C. bodinieri var. giraldii (Hesse) Rehd., that accredited to Hooker is C. brevipes (Benth.) Hance, that accredited to "sensu Hemsl." is C. japonica var. angustata Rehd., while that attributed to Hemsley is in part C. bodinieri var. giraldii and in part C. japonica var. angustata.

According to P'ei (1932) "Hemsley's original description is as follows: 'Fere undique glabra mitidaque, foliis valde longatis anguste lanceolatis usque 9 poll. longis, subtus pallidioribus parce aureo-pulverulentis ceterum glabris, cymis distincte pedunculatis, floribus minutis. — C. longifolia Hance in Ann. Sc. Nat. 5me série, v. p. 233 et Maxim. in Mém. Biol. XII. p. 507. VIX lam. Kwangtung: near Canton (Hance 49561) Mus. Brit. Herb. Kew. Variable as C. longifolia is as limited here and in the "Flora of British India", the present form stands out very distinctly from all the others and should perhaps be raised to specific rank.'" He cites Chang 4544, Chung 2477 & 2800, Ging 7212, 7294, & 15778, and Po 42049 from Fukien, McClure 3454 from Kiangsi, Ching 7738 from Kwangsi, Chun 6922 from Kwangtung, Tsang 810 from Hainan Island, and Herb. Canton Chr. Coll. 238 and E. D. Merrill 9986 from Honam Island. He says further "Callicarpa longissima (Hemsl.) Merr. has nearly glabrous leaves except for the long villose hairs along the veins on the upper surface, and a ring of long hairs at each node of the branchlets. It is related to Callicarpa longifolia Lam. and C. brevipes Hance differing from the former by its leaves being glabrous beneath, and pubescent above only along the veins; from the later by its attenuate leaf-base; and from both by its long narrow leaves." His C. longissima f. subglabra is described by him as follows: "A typo differt foliis subglabris, ovato-lanceolatis ad elliptico-lanceolatis, 12.5 to 20 cm. longis 3 to 4.7 cm. latis, nodis band barbatis. Kwangtung: Lungtau Mt., near Iu, Peng (To), Tak (Ts'ang) and Kin (Ts'ang) 2961, May 1924, 'Shrub 4 feet tall, flowers white and yellow'; same locality, Peng (To), Tak (Ts'ang) and Kin (Ts'ang) 5571, June 1924, 'Flowers yellowish white'; North River, near Funghanhu, Peng (To), Tak (Ts'ang) and Kin (Ts'ang) 8261, July 1924, 'Flowers white'. This differs from the type by its leaves being glabrous above and subglabrous beneath. There is no ring of long hairs at the nodes of the branchlets."

The type of C. taiwaniana was collected by Sigetaka Suzuki (no. 5945) at Sankyaku and Suigen, Formosa, and is deposited in the her-

barium of the National Taiwan University.

Chang (1951) maintains C. longissima, C. longissima f. subglabra, and C. taiwaniana as three distinct and valid taxa, although he seems not to be entirely certain about the last-named of these. For C. longissima in what he regards as its typical form he cites H. Green s.n. and nos. 15, 60, 61, 443, 365, 810, 1785, 4752, 5826, 6922, 6996, 7680, 7738, 9903, 9942, 13591, 16309, 22350, 23063, 25112, 27187, 28236, 30204, 37772, & 72815 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters. He compares it with C. dolichophylla Merr.

For what he regards as C. longissima f. subglabra Chang cites nos. 774, 1801, 4084, 20015, 22628, 24001, 26827, 29033, 30946, 55338, 72465, 84765, & 84994 of collectors and/or herbaria whose names, again, he gives only in Chinese characters.

Recent collectors have found C. longissima growing on hillsides, wooded hillsides, low slopes, and dry land, in forests, wooded places, thickets, and dry places by the sides of houses, and at pondsides, at altitudes of 10 to 1600 meters, flowering from May to August and in October, and fruiting from September to March. Ching describes it as "common" in Kwangsi; Lau found it to be "fairly common on dry steep slope in sandy soil of rocky forest" on Hainan Island; and Tsang describes it as "fairly common in village commons in dry sandy soil and silt" in Kwangsi. E. D. Merrill 9986 is said to be a topotype.

Vernacular names for the plant appear to be "bok wat tan", "fat fung shu", "long-leaved beauty-berry", and "taai tsin mi fung". The corolla is described as "red" on W. T. Tsang 22628, "pink" on H. H. Chung 2800 and F. C. How 72815, "purple" on R. C. Ching 7738, "green" on H. H. Chung 2477, "white and yellow" on Peng, Tak, & Kin 296, "yellowish-white" on Peng, Tak, & Kin 557, and "white" on Peng, Tak, & Kin 826.

Callicarpa longissima closely resembles C. brevipes f. serrulata P'ei, but the latter has serrate or serrulate leaf-blades, whereas in C. longissima the leaf-blades are entire or subentire. Some specimens (e.g., R. C. Ching 6996) also greatly resemble the M. Ramos 2037 collection which is regarded by me as representing C. dolichophylla Merr. Li (1963) cites H. H. Bartlett 6082, Nakahara s.n., Sasaki s.n., Suzuki 5945, and E. H. Wilson 9821 & 10108 from Formosa.

Material of this species has been misidentified and distributed in herbaria as C. brevipes (Benth.) Hance, C. longifolia Lam., and Clerodendron sp. On the other hand, the H. H. Bartlett 6082, cited by Li and distributed as C. longissima, is actually C. randaensis Hayata. It is probable that the other Formosan material cited by Li also represents that species.

In all, 38 herbarium specimens and one mounted photograph have been examined by me.

Citations: CHINA: Fukien: T. C. Chang 4544 (Ca--303271); H. H. Chung 2477 (Ca--233064), 2800 (Ca--243756); Ging 7212 (Ca--322261), 7294 (Ca--322357), 15778 (Ca--342188); Po 12049 (Ca--325897). Ki-angsi: F. A. McClure 3454 [Herb. Lingnan Univ. 15316] (Ca--319928). Kwangsi: R. C. Ching 6996 (N), 7738 (Ca--410284, N, W--1248679); W. T. Tsang 22628 (S). Kwangtung: Peng, Tak, & Kin 296 [Herb. Canton Chr. Coll. 12295] (W--1247648), 557 [Herb. Canton Chr. Coll. 12556] (Ca--275009, W--1248182), 826 [Herb. Canton Chr. Coll. 12825] (W--1248035). Province undetermined: Nevin s.n. [China] (Du--90911). CHINESE COASTAL ISLANDS: Hainan: F. C. How 72815 (Bi, S); Lau 3282 (Bi, S); W. T. Tsang 810 [Herb. Lingnan Univ. 16309] (Ca--326101, N, S, W--1249841). Honam: Dahlström 486 (S); C. O. Levine s.n. [Herb. Canton Chr. Coll. 238] (Io, W--778597); E. D. Merrill 9986 (Ca--992456, Gg--31976, N--photo, Ph). FORMOSA: E. H. Wilson 10108 (W--1052933, W--1052934). CULTIVATED: China: Chun 6922 (Bz--18069, Bz--18070, N); Hom A.354 (N).

CALLICARPA LUTEOPUNCTATA Chang, Acta Phytotax. Sin. 1: 292. 1951.

Bibliography: H.-T. Chang, Acta Phytotax Sin. 1: 272, 280, 292, 310, & 311. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

Chang (1951) describes this species as follows: "Frutex circ. 2 m altus. Ramuli hornotini teretes fulvo-brunnei farinoso-stellato-lepidoti, annotini brunnei lenticellati glabri. Folia membranacea oblonga, 7--12 cm longa 2--4 cm lata, apice acuta vel breviter acuminata, basi in petiolum longissime attenuata, utrinque glabra lucide aureo-glandulosa, in sicco supra brunneo-viridia, subtus fulvo-viridia ad costam nervosque laterales parcissime farinoso-stellato-puberula, margine in parte 3/4 superiore irregulariter serrulata; nervi laterales utrinsecus 8--11 supra plani subtus elevati; petioli 1--1.5 cm longi. Cymae axillares graciles 2 cm longae, 2--3 cm latae, quinquies dichotomae, pedunculis 4--7 mm longis, pedicellis 1--1.5 mm longis; bracteae subulatae 2 mm longae; calyx 0.7 mm longus truncatus farinosus et glandulosus, lobis inconspicuis; corolla violaceo-purpurea glabra, tubo 1 mm longo, lobis 0.4 mm longis; stamina longe exserta, filamentis 3 mm longis, antheris ovalibus 0.4 mm longis longitudinaliter dehiscentibus; ovarium punctatum glabrum, stylo stamina subaequante. Fructus 1 mm diametro punctatus."

The species is based on W. P. Fang 17252 from Szechuan, deposited in the herbarium of the Botanical Institute of Sunyatsen University, Canton, China. From the same province is cited W. P. Fang 17200, while from Yunnan Chang cites E. E. Maire 34 and H. T. Tsai 51132. He compares the species with C. bodinieri var. giraldii (Hesse) Rehd. and C. longifolia Lam., but in Chinese.

CALLICARPA MACROPHYLLA Vahl, Symb. Bot. 3: 13, pl. 53. 1794.

Synonymy: *Callicarpa tomentosa* König ex Vahl, Symb. Bot. 3: 13, in syn. ["*Callicarpae tomentosae*"]. 1794; Jacks. in Hook. f. &

Jacks., Ind. Kew., pr. 1, 1: 386, in syn. 1893 [not C. tomentosa Auct., 1962, nor Bakh., 1932, nor Hook. & Arn., 1918, nor "L. ex Moldenke", 1959, nor "L. ex Spreng.", 1825, nor "L. ex Willd.", 1966, nor (L.) Murr., 1774, nor (L.) Santapau, 1965, nor Lam., 1783, nor Murr., 1893, nor Thunb., 1959, nor Willd., 1809, nor "sensu auct. Japon.", 1965, nor "sensu Matsum.", 1964, nor "sensu Matsum. & Hayata", 1963]. Callicarpa foliis lanceolato-ellipticis crenatis attenuatis, supra rugosis subtus ramisque tomentoso-incanis Vahl ex Willd., Linn. Sp. Pl. 1: 620, in syn. 1797. Callicarpa incana Roxb., Hort. Beng. [10], hyponym. 1814; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 407—408. 1820 [not C. incana (Turcz.) Moldenke, 1934, nor (F.) Moldenke, 1953]. Callicarpa roxburghii Wall., Numer. List [50] (as "49"). 1829 [not C. roxburghii H. J. Lam, 1948, nor Schau., 1890, nor "Wall. ex Schau.", 1968, nor "Wall. ex Walp.", 1968]. Callicarpa cana Gamble ex C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568, in syn. 1885 [not C. cana Dalz. & Gibs., 1919, nor L., 1771, nor Spreng., 1966, nor Vahl, 1866, nor Wall., 1863]. Callicarpa macrophylla var. incana Roxb. ex Kuntze, Rev. Gen. Pl. 2: 503. 1891. Callicarpa dunniana Léveillé in Fedde, Repert. Spec. Nov. 9: 456. 1911. Callicarpa macrophylla var. kouytchensis Léveillé, Fl. Kouy-Tchéou 440, hyponym. 1915. Callicarpa tomentosa Vahl apud H. J. Lam, Verbenac. Malay. Arch. [371]. 1919. Callicarpa macrophylla Vahl ex Moldenke, Alph. List Invalid Names Suppl. 1: 3, in syn. 1947. Callicarpa carnea Hort. ex Moldenke, Résumé 242, in syn. 1959. Callicarpa macrophylla Roxb. ex Moldenke, Résumé 245, in syn. 1959. Callicarpa macrophylla Wall. ex Moldenke, Résumé 245, in syn. 1959. Callicarpa tomentosa "Koen. ex Vahl" apud Balakrishnan, Bull. Bot. Surv. India 6: 81 & 87. 1964.

Bibliography: Vahl, Symb. Bot. 3: 13, pl. 53. 1794; Willd., Linn. Sp. Pl. 1: 620. 1797; W. T. Ait., Hort. Kew., ed. 2, 1: 247. 1810; Roxb., Hort. Beng. [10]. 1814; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 2: 205 (1817) and ed. quart., 2: 253. 1818; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 94—95. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 407—408 & 481. 1820; Steud., Nom. Bot., ed. 1, 137. 1821; Kunth, Syn. Pl. Aequinoct. 2: 45. 1823; Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825; J. A. & J. H. Schultes, Mant. 3: 51 & 53. 1827; Spreng. in L., Syst. Veg., ed. 16, 5: 126. 1828; Wall., Numer. List [50] (as "49"). 1829; Roxb., Fl. Ind., ed. 2 [Carey], 1: 393—394. 1832; Royle, Ill. Bot. Himal. 299. 1836; Bojer, Hort. Maurit. 258. 1837; D. Dietr., Syn. Pl. 1: 428 & 429. 1839; Dillwyn, Rev. Ref. Hort. Malab. 19. 1839; Steud., Nom. Bot., ed. 2, 137. 1840; Walp., Repert. Bot. Syst. 4: 126 & 127. 1845; Schau. in A. DC., Prodr. 11: 644. 1847; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; Champ. & Hook. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; Mason, Burmah, ed. 2, 792. 1860; Benth., Fl. Hongk. 270. 1861; Rosenth., Syn. Pl. Diaph. 1130.

1862; Bocq., *Adansonia* 3: 192. 1863; Bocq., *Rév. Verbenac.* 192. 1863; Pritz., *Ic. Bot. Ind.* 1: 188. 1866; Hassk., *Hort. Malab.* Rheed. *Clav.* 38. 1867; Brandis, *For. Fl. NW. & Cent. India* 3: 368. 1874; Romb., *Fl. Ind.*, ed. 3 [C. B. Clarke], 131—132. 1874; S. Kurz, *For. Fl. Brit. Burma* 2: 274. 1877; Gamble, *List Trees Darjeeling Dist.* 60. 1878; Gamble, *Man. Ind. Timb.*, ed. 1, 282 & 283. 1881; Watt, *Econ. Prod. India* 5: 68. 1883; E. Balf., *Cyclop. Ind.*, ed. 3, 1: 550. 1885; C. B. Clarke in Hook. f., *Fl. Brit. Ind.* 4: 568. 1885; Maxim., *Mél. Biol.* 12: 505. 1886; Campbell & Watt, *Description. Econom. Prod. Chutia Nagpur* 41. 1886; Watt, *Dict. Econ. Prod. India* 2: 26 & 27. 1887; K. Schum. & Hollr., *Fl. Kaiser Wilh.-land* 118—119. 1889; N. E. Br. in Johnson, *Gard. Dict.* 157. 1890; Forbes & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 26: 254 & 255. 1890; Warb. in Engl., *Bot. Jahrb.* 13: 426. 1891; Kuntze, *Rev. Gen. Pl.* 2: 503. 1891; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 1, 1: 386. 1893; J. L. Stewart, *Punjab Pl.* 165. 1899; K. Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee* 522. 1900; Barnhart, *Bull. Torrey Bot. Club* 29: 590. 1902; Collett, *Fl. Siml.* 380. 1902; Wood, *Rec. Bot. Surv. India* 2: 21 & 129. 1902; Gamble, *Man. Ind. Timb.*, ed. 2, 525—526. 1902; Prain, *Bengal Pl.*, ed. 1, 827 & 828. 1903; Prain, *Rec. Bot. Surv. India* 3: 260. 1905; Brandis, *Ind. Trees* 512. 1906; Strachey, *Cat. Pl. Kumaon* 136. 1906; Duthie, *Fl. Upper Gang. Plain* 2: 219. 1911; Léveillé in Fedde, *Repert. Spec. Nov.* 9: 456. 1911; Gerth van Wijk, *Dict. Plantnames* 1: 217. 1911; Dunn & Tutchet, *Kew Bull. Misc. Inf. Addit. Ser.* 10: 202. 1912; Fedde, *Repert. Spec. Nov. Gesamtverz.* 58. 1914; Léveillé, *Fl. Kouy-Tchéou* 440. 1916; Gerth van Wijk, *Dict. Plantnames* 2: 1534. 1916; Basu, *Ind. Medic. Pl.* 3: 3, pl. 734. 1918; R. N. Parker, *For. Fl.* 397. 1918; H. J. Lam, *Verbenac. Malay. Arch.* 57, 58, & 65. 1919; Bakh. in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 11 & 23. 1921; Prain, *Ind. Kew. Suppl.* 5, pr. 1, 43. 1921; Haines, *Bot. Bihar & Orissa* 4: 709 & 710. 1922; Chung, *Mem. Sci. Soc. China* 1 (1): 226. 1924; J. M. Cowan, *Rec. Bot. Surv. India* 12: 68. 1929; Stapf, *Ind. Lond.* 1: 526. 1929; P'ei, *Mem. Sci. Soc. China* 1 (3): [Verbenac. China] 15, 18, 19, 23—25, 42, & 43. 1932; P'ei, *Sinensia* 2: 66. 1932; P. Dop, *Bull. Soc. Hist. Nat. Toulouse* 64: 500, 505, 506, 511, & 512, 1932; Rehd., *Journ. Arnold Arb.* 15: 320 & 321. 1934; Junell, *Symb. Bot. Upsal.* 4: 81 & 82, fig. 128—132. 1934; E. D. Merr., *Trans. Am. Philos. Soc.*, new ser., 24: 332—333. 1935; Moldenke in Fedde, *Repert. Spec. Nov.* 39: 303 (1936) and 40: 41, 104—106, 108, 113, 114, 120, 124, 125, 127, 128, & 130. 1936; K. V. O. Dahlgren, *Svensk. Bot. Tidsk.* 32: 231. 1938; Fletcher, *Kew Bull. Misc. Inf.* 1938: 412 & 414. 1938; A. W. Hill, *Ind. Kew. Suppl.* 9: 45. 1938; Moldenke, *Alph. List Common Vern. Names* 6, 21, 30, & 31. 1939; Moldenke, *Geogr. Distrib. Avicenn.* 36. 1939; Moldenke, *Suppl. List Common Vern. Names* 3, 7, 14, 17, & 20—22. 1940; Moldenke, *Prelim. Alph. List Invalid Names* 9—13. 1940; Biswas, *Indian Forest Rec. Bot.*, new ser., 3: 41. 1941; Moldenke, *Known Geogr. Distrib. Verbenac.*, ed. 1, 53—56, 58, 67, 71, & 87. 1942; Moldenke, *Alph. List Invalid Names* 8, 10, & 11. 1942; Moldenke, *Phytologia* 2: 82 & 94. 1945; E. D. Merr., *Trans. Am. Philos. Soc.*, new ser., 24 (2):

[Comm. Lour.] 332—333. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Alph. List Cit. 1: 48, 119, 248, 284, & 288. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; Neal, In Gard. Hawaii, ed. 1, 640. 1948; H. N. & A. L. Moldenke, Fl. Life 2: 57 & 62. 1948; Moldenke, Alph. List Cit. 2: 355, 359, 408, 432—434, 487, 534, 562, 563, 565, 580, 614, & 634 (1948), 3: 708, 774, 798, 828, 878, 936, 971, & 978 (1949), and 4: 1018, 1096, 1102, 1103, & 1251. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 123—125, 128, 131, 135, 148, 157, & 177. 1949; Moldenke, Phytologia 3: 139 (1949) and 3: 294. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 277—279, 283—284, 308, & 311. 1951; Moldenke, Phytologia 4: 121 & 124 (1952) and 4: 268. 1953; Moldenke, Journ. Calif. Hort. Soc. 15: 85. 1954; Moldenke in Humbert, Fl. Madag. 174: 45 & 48. 1956; T. A. Rao, Bull. Bot. Surv. India 1: 114. 1959; Moldenke, Résumé 155, 157—160, 165, 168, 174, 177, 200, 213, 242, 243, 245, 247, 248, & 444. 1959; Anon., Kew Bull. Gen. Index 1929—1956, p. 59. 1959; Kikamura, Fauna & Fl. Nepal 208—209. 1959; Puri, Indian Forest Ecol. 1: 215 & 228 (1960) and 2: 670. 1960; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Nath, Bot. Surv. South. Shan States 144. 1960; Deb, Bull. Bot. Surv. India 3: 314. 1961; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 13. 1962; Moldenke, Résumé Suppl. 3: 16 & 28. 1962; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 371, 375, & 384, pl. 12, fig. 49 & 50. 1963; Maheshwari, Fl. Delhi 280 & 281. 1963; Prain, Bengal Pl., ed. 2, 2: 617 & 618. 1963; Cave, Ind. Pl. Chromosome Numb. 2: 330. 1964; Panigrahi, Chowdhury, Raju, & Deka, Bull. Bot. Surv. India 6: 255. 1964; Padmanabhan, Phytomorph. 14: 449. 1964; T. A. Rao, Bull. Bot. Surv. India 6: 47. 1964; Balakrishnan, Bull. Bot. Surv. India 6: 81, 82, & 86—87. 1964; Dakshini, Journ. Indian Bot. Soc. 44: 418 & 419. 1965; Backer & Bakh., Fl. Java 2: 600—601. 1965; Datta, Handb. Syst. Bot. 181. 1965; Sen & Naskar, Bull. Bot. Surv. India 7: 38. 1965; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 35 & 89, pl. 12, fig. 154. 1965; Moldenke, Phytologia 13: 437 & 502 (1966) and 14: 37, 38, 107, 111, 114, 115, 142, 143, 149, & 150. 1966; Panigrahi & Joseph, Bull. Bot. Surv. India 8: 143 & 151. 1966; Thothathri, Shetty, & Hazra, Bull. Bot. Surv. India 8: 133 & 138. 1966; Yamazaki in Hara, Fl. East. Himal. 268. 1966; Moldenke, Résumé Suppl. 14: 6 & 7 (1966) and 15: 8. 1967; R. K. Gupta, Season. Fl. Ind. Sum. Resorts Moos. 132, 154, & 241. 1967; Tingle, Check List Hong Kong Pl. 37. 1967; R. R. Stewart, Pakistan Journ. Forest. 17: 515. 1967; Moldenke, Phytologia 14: 225 & 244—246 (1967), 15: 30 (1967), and 16: 360, 362, 364, 380—382, 384—388, 447, & 454. 1968; Uniyal, Indian Forest. 94: 415. 1968; S. P. & R. N. Banerjee, Bull. Bot. Surv. India 10: 187. 1968; Moldenke, Résumé Suppl. 16: 8, 9, 13, & 18. 1968; M. A. Rau, Bull. Bot. Surv. India 10, Suppl. 2: 61. 1969; Kapoor, Singh, Kapoor, & Srivastava, Lloydia 32: 303. 1969; Farnsworth, Pharmacog. Titles 5 (11): iii & item 11440. 1970; Moldenke, Phytologia 20: 495 (1971) and 21: 49, 50, 102, 108, & 109. 1971.

Illustrations: Vahl, Symb. Bot. 3: pl. 53. 1794; Basu, Ind.

Med. Pl. 3: pl. 734. 1918; Junell, Symb. Bot. Upsal. 4: 82, fig. 128—132. 1934; Sharma & Mukhopadhyay, Journ. Genet. 58: 384, pl. 12, fig. 49 & 50. 1963; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 89, pl. 12, fig. 154. 1965.

Bush, undershrub, or large, robust, bushy, many-stemmed shrub, 1--6 m. tall, or tree, 7 m. tall; trunk 2 cm. in diameter; branches stout, subterete, tomentose or densely canescent-tomentose at the tips, becoming glabrate in age, with scattered elliptic and prominently elevated lenticels, often bearing many old fruiting cymes at the nodes; branchlets stout, obtusely tetragonal or subterete, extremely densely matted-tomentose with canescent and many-branched hairs; principal internodes variable in length, 1.1--8 cm. long; leaves decussate-opposite; petioles very stout, 6--20 mm. long, canaliculate above, densely matted-tomentose like the branchlets; leaf-blades chartaceous, rather dark-green or pale-green and velvety above, tawny and densely stellate-woolly or whitish beneath, oblong or oblong-ovate, 6--23 cm. long, 2.5--9.7 cm. wide, acute or acuminate at the apex, rather uniformly and more or less shallowly serrate with rather sharp teeth along the margins (except at the base), acute or somewhat cuneate at the base, roughened-pilose above with minute hairs or tomentose when very immature, occasionally somewhat areolate, very densely grayish- or sordid-tomentose with matted many-branched hairs beneath; midrib stout, somewhat tomentose above (especially at the base), very densely tomentose and prominent beneath; secondaries slender, 7--15 or more per side, arcuate-ascending, prominent beneath, often slightly prominulent above; vein and veinlet reticulation fine, conspicuous; inflorescence axillary, large; cymes decussate, solitary, often very numerous, large or very large and spreading, 4--20 cm. long, 7--17 cm. wide, usually densely many-flowered, very spreading-dichotomous (often 8 times furcate!), very angulate, often forming a dense mass around the branchlets by the spreading and more or less reflexed dichotomies, bracteolate; peduncles stout (often incrassate in fruit), 1.3--2.6 cm. long, densely matted-tomentose like the branchlets, becoming merely furfuraceous in age; pedicels essentially obsolete or exceedingly short; bractlets linear or broadly linear, 3--10 mm. long, densely sordid-tomentose; prophylla minute, setaceous; flowers conspicuous, fragrant; calyx oblong-campanulate, 1.3--1.6 mm. long, 1--1.3 mm. wide, loosely pubescent and granular-pulverulent, its rim conspicuously 4-toothed; corolla hypocrateriform, purple or lilac, glabrous outside or with some hairs, its tube narrow-cylindric, 1--2 mm. long, its limb 4-parted, the lobes ovate-lingulate, about 0.9 mm. long and 0.8 mm. wide, subacute at the apex; stamens 4, inserted at the very base of the corolla-tube, exserted; filaments filiform, about 3.6 mm. long, glabrous; anthers broadly oblong, about 0.5 mm. long and 0.4 mm. wide; pollen-grains spheroidal, 3-zoncolpate, subprolate, $32 \times 25 \mu$ or "diameter 35μ ", range $32-39 \mu$ ", the exine 1.4μ thick, the ectine surface slightly reticulate (wavy) or areolate with faint areoles; pistil exserted and surpassing the stamens (in \varnothing); style capillary, about 6 mm. long, glabrous, ampliate above into the stigma; stigma

depressed-capitate, about 0.2 mm. wide; ovary subrotund, about 0.7 mm. long and wide, densely granulose-pulverulent, 4-celled; fruiting-calyx very shallowly cupuliform or practically patelliform, about 2 mm. wide, loosely pubescent, its rim 4-toothed; fruit small, subglobose, white when ripe, about 2 mm. long and wide, pulverulent or glabrate, conspicuously 4-seeded; chromosome number: $2n = 34$.

This species is native from China southward into Nepal, Bhutan, India, Burma, and Hongkong, and east to New Guinea. It has been introduced in Réunion and Madagascar and is also widely cultivated elsewhere. The corolla is described as "pink" on Pradham & Ihapa 4497 and T. A. Rao 7201, "red" on Steward & Cheo 876, "purple" on A. Henry 9262, "purplish-pink" on Winit 1152, "blue" on Tsiang 6371, "red and purple" on G. W. Groff 10, and "violet" on Larsen, Santisuk, & Warncke 2774. As usual, one wonders if the color of the corolla really varies so much or if it is merely a matter of interpretation and definition of color by the collector.

Collectors have found the species growing on hillsides, in sandy riverbeds, ricefields, forests, deep forests, and valley forests, in thick jungles, bamboo shrubbery, thickets, open scrub, and waste places about villages, and on open slopes, from sealevel to 2000 meters altitude, flowering from May to October, as well as from January to March, and fruiting from October to February and in August. Rao (1959) refers to the species as "a large herb" with the flowers "in dense spikes" [which is obviously an error!] and cites Rao 7201. Dakshini (1965) reports this plant as one of the major constituents of the "poor shrubbery layer", the "shrub story on slopes", and "in moist soil of swamps" in the Dehra Dun region of India, where he says that the species is common. Juan reports it as "rare" in Upper Burma and Ching calls it "rare" in Kwangsi. Panigrahi & Joseph (1966) aver that it is abundant in thick evergreen forests in Nefa and cite their no. 16728, while Thothathri and his associates (1966) report it as common near plantations in Bihar and cite Shetty 180.

The Banerjees (1968) also record C. macrophylla from Bihar, while Gupta (1967) and Uniyal (1968) found it growing in Uttar Pradesh. Yamazaki (1966) gives its overall distribution as "Himalaya (Kashmir to Assam), Bengal, Burma, Indo-China, and S. China". Maheshwari (1963) tells us that it is "Cultivated as a hedge plant in gardens" in the Delhi region and cites J. K. Maheshwari 218. He describes the plant as "An erect shrub up to 3 m. tall. Branches, lower surface of leaves and inflorescences densely stellate-woolly. Leaves up to 22 x 7 cm., ovate, elliptic or ovate-lanceolate, coarsely crenate-serrate. Flowers rose-coloured, crowded in dense, dichotomous cymes. Drupes white," flowering from June to September. Gupta (1967) describes the corollas as "pink". Prain (1903) calls the plant "A shrub 3—8 feet high", growing "In all the provinces" of Bengal. Uniyal (1968) calls it a "small drooping shrub with purple flowers growing commonly in shade at 900 m." He cites Uniyal 3800 and notes that "a very small quantity is collected and

consumed locally, the seed-paste being used for mouth ulcers" in Uttar Pradesh. In the same state Puri (1960) tells us that C. macrophylla grows in the third story in edaphic Gangetic tropical moist deciduous river rainforests in the sub-Himalayan tract under a canopy of Bombax malabaricum and Gmelina arborea, and also that it inhabits riverbeds and grows along streams in swamp-edaphic forests on clay beds with 100 inches of annual rainfall which goes underground and then oozes out, making small streams. These are mixed forests mainly consisting of Bischofia javanica. He also tells us that the species is considered to be good fodder in the states of Punjab, Pepsu, Delhi, Uttar Pradesh, Himalchal Pradesh, Jammu, and Kashmir in northern India.

Because of the considerable misinterpretation of this species in the past, it is perhaps worthwhile to reproduce here the original description and certain other relevant descriptions. Vahl (1794) first described this taxon as follows: "Callicarpa foliis lanceolato-ellipticis crenatis attenuatis, supra rugosis subtus ramisque tomentoso-incanis. Tab. LIII. Habitat in India orientali König. ¶ Rami obscure tetragoni, uti petioli & pedunculi, tomento denso sublanato tecti, ut in Call. lanata. Folia petiolata, opposita, spithamæa & ultra. sæpe uncias tres lata, crenata, inferne versus integerrima, apice attenuata, basi obtusa, supra nervosa: nervis canescentibus, venoso rugosa, villis rarissimis minutis adspersa, subtus tomentosa, incana, tomento tenuiore quam in ramis, nervis elevatis venisque simplicibus obliquis inter nervos: huiusmodi utrinque cana. Petiolus pollicaris. Paniculae axillares, dichotome-ramissimæ, oppositæ, bipollicares: ramis divaricatis. Pedunculus universalis longitudine petiolorum. Bractee ad ramificationes oppositæ, lineares. Calyx minutus, quadridentatus, incanus. Corollae laciniae oblongo-subcuneatæ, glabræ. Stamina & pistilla flore longiora. Sub nomine Callicarpæ tomentosæ misit Königius, differt vero, ut ex descriptione patet, foliis lanceolato-ellipticis crenatis, nec ovatis integerrimis denticulatisque."

Roxburgh (1820) modified Vahl's description as follows: "C. macrophylla. Vahl. Symbol. iii. 13. t. 53. Shrubby, downy. Leaves opposite, ovate-lanceolate, serrulate, reticulate, hoary underneath. Corymbs axillary, dichotomous, rather longer than the petiols. Berry minute, white. Native of Silhet and Chittagong. A shrub from four to eight feet in length. Trunk scarcely any, but several, round, erect branches, covered with white down. Leaves opposite, petioled, lanceolate, or oblong lanceolate, fine-pointed, finely serrate, wrinkled, above soft and a little downy, below covered with much whitish soft down, from six to nine inches long, and two or three broad. Stipules none. Petiols about an inch long, downy. Corymbs axillary, peduncled, two-forked nearly globular, downy, many times shorter than the leaves. — Peduncles as long as the petiols, round and downy. — Bractes lanceolate, one under each division of the corymb. — Flowers very numerous, small, rose-coloured. — Calyx woolly the four divisions distinct

and acute." The fruit, of course, is a drupe, not a berry, and the inflorescence is a cyme, not a corymb.

Roxburgh's C. incana is described (1820) as follows by him: "C. incana R. Shrubby, young shoots hoary. Leaves lanceolate, obtusely serrulate, fine and entire-pointed, hoary underneath. Mashandari Asiat. Res. lv. 233. Beng. Muttura, Muttrunja. A stout shrub, with all the tender parts and the under surface of the leaves densely clothed with long, soft, white, stellate pubescence; common in the vicinity of Calcutta, where it is in flower and seed nearly the whole year. I long considered this to be Vahl's macrophylla, but on rearing what I also took for the same species from Silhet and Chittagong, in the Botanic Garden, I could plainly observe a striking difference when growing near each other, and as the Chittagong and Silhet sort agrees much better with Vahl's figure and description I must consider it to be his macrophylla. In the Calcutta plant, which I now call incana, the leaves are never so broad in proportion to their length, more round at the base; much more pointed, with the long taper-points entire; all the rest of the margin, except what may be called the base, obtusely-serrulate. In macrophylla, the leaves are crenate, more obtuse, and the margins cut to the very apex; the two are however very nearly allied, though I think sufficiently distinct to authorize their being considered as different." Kuntze (1891) reduced this to varietal rank under C. macrophylla, although he accredited the variety to Roxburgh, and describes it as "Folia angustiora (1: 3--5). Bengalen, Sikkim." In this disposition he may be correct although as yet I have been unable to separate the two forms satisfactorily.

Léveillé's original description (1911) of C. dunniiana is "Habitu et aspectu affinis C. macrophyllae Vahl a quo differt: serraturis foliorum tenuioribus; foliis supra viridibus nec rubescentibus, tomento candido nec cinereo aut flavido, antheris eglandulosis et inflorescentia axillari, foliosa nec divaricato-corymbosa et terminali. Kouy-Tchéou: Environs de Hoong-Ko-Chou, vallée de Pa-Lin-Kiao (Tchen-Lin). Arbuste à fleur d'un violet-pourpre, 20 juin 1898 (D. Séguin, 243a); Long-chan, juin 1906, fleurs rouges (Jas. Esquirol, 869)."

Bakhuizen van den Brink (1921) describes C. macrophylla as follows: "A shrub, 3--5 M. high; branchlets, cymes, petioles densely mealy or woolly; leaves rather large, coriaceous, oblong or sub-lanceolate, base obtuse or rounded, often subcordate, apex rather long acuminate, margins crenate vel obtusely serrate, except at the base and the top, upper side, when adult, densely hairy, the stellate hairs often stubbily broken, lower side softly white or greyish tomentose; pairs of nerves 10--15; 10--35 c.M. long, 3--18 c.M. broad; petioles 1--2 c.M.; cymes rather small, globose, 3--5 c.M. long, 3--10 c.M. in diam.; peduncles short, 1--2 c.M. long; calyx cupuliformous, densely floccose outside, 0.10--0.15 c.M. long; shortly 4-toothed, teeth subincurved, 0.01--0.015 c.M. long; corolla exsert 0.3--0.45 c.M., tube glabrous, 1 1/2 -- 2

times as long as the calyx, lobes 4, ovate, 0.1--0.12 c.M. long, 0.15--0.20 c.M. broad, glabrous or with some hairs outside; stamens 0.5--0.6 c.M.; anthers glandular, 0.07--0.10 c.M.; style 0.6--0.7 c.M., with subpeltate or obscurely 4-lobed stigma; ovary glabrous, glandular; drupe glabrous, white when mature, 4-seeded. Distribution: Brit.-India! Malabar! Himalaya! Nepal! Assam! Silhet! Bengal! Burma! Hainan! Hongkong! China! N.-Guinea (Warb.! Lauterb.!)! -- Mascarenes (Schau.)! Réunion (Cordem.)!"

Gamble (1881), under the name C. cana L., describes C. macrophylla as "A shrub. Bark thin, grey-brown. Wood white, soft. Annual rings marked by a line of closer pores. Pores moderate-sized, sometimes subdivided. Medullary rays moderately broad, the distance between them greater than the transverse diameter of the pores. Bengal. Common in forests and along roadsides in the Terai and Dûars, extending probably southwards to the Ganges. It has pretty pink flowers."

Backer & Bakhuizen van den Brink (1965) describe C. macrophylla from Java as follows: "Petiole 10--25 mm long; leaves oblong or lanceolate, from a cuneate, obtuse, rounded, or subcordate base, with an acuminate or tapering base, rather acute, crenate-serrate, at first on the upper surface densely covered with stellate hairs, afterwards with very numerous stubble-like rests of these, 10--35 cm by 2--18 cm. Cymes on 1--2 cm long peduncles, densely stellate-hairy, 3--10 cm across; pedicels gland-dotted; calyx minutely denticulate, with numerous yellow, glandular dots, basally coarsely stellate-hairy, 1 -- 1 1/2 mm long; corolla violet, outside thinly hairy or glabrous, with yellow glandular dots, 3 -- 4 1/2 mm high; stamens 5--6 mm; drupe white. Shrub. 3.00--5.00; I--XII; native to SE. Asia; in Java, 10--600, cultivated as an ornamental."

Champion & Hooker (1853) state that C. macrophylla is related to C. integerrima Champ., which is easily distinguished by its broad entire leaves and dense golden tomentum. Rosenthal (1862) says "Callicarpa Rheedii Kost. soll Rheedes Tondi-Teregam (IV.60) sein, wohin Dennstedt fragweise Callicarpa macrophylla Vahl. zieht." Lam (1919) says of his C. pedunculata var. glabriuscula "This variety has an affinity with C. macrophylla, with which some authors confound the species, by the form of its leaves, especially in regard to the base."

A memorandum by C. E. C. Fischer and T. A. Sprague, preserved in the Britton Herbarium at the New York Botanical Garden, and dated August 18, 1931, states: "(1) The name Callicarpa Roxburghii was published by Wallich, Cat. nb. 1833 (1828--29) as a new name for C. incana Roxb., non C. cana L. It was effectively published since it is associable with the description of C. incana Roxb., but is an illegitimate name because it was superfluous. (2) Walpers, Rep. iv. 127 (1844--48) published a description of C. Roxburghii apparently based on Wall. Cat. n. 1833, specimen. A much better description of Callicarpa Roxburghii Wall. Cat. n. 1833, specimen, was published by Schauer in DC. Prodr. xi. 640 (1847).

This mentions the setaceous calyx-lobes [and is now known as C. kochiana Mak.]. (3) C. B. Clarke (F. B. I. iv. 568) and Lam (Bull. Jard. Bot. Buitenz. ser. 3, iii. 23) reduce C. incana Roxb. to C. macrophylla Vahl, apparently correctly. (4) Callicarpa Roxburghii Wall. (1828--29) is accordingly a taxonomic synonym of C. macrophylla Vahl. (5) The specimen of Callicarpa Roxburghii Wall. Cat. n. 1833 described by Walpers (?) and Schauer belongs, however, to a different species, namely the South Chinese Callicarpa included in Index Fl. Sin. ii. 255 (1890) as C. tomentosa Willd. It has the characteristic calyx-lobes of this South Chinese plant" [which is now known as C. kochiana Mak.]

Kuntze (1891) regarded C. roxburghii Wall. as distinct from C. macrophylla and listed "C. tomentosa W. non L." as a synonym of C. roxburghii. This confusion was due to the situation explained by Fischer and Sprague in the above-quoted memorandum. We regard C. tomentosa Willd. as a synonym of C. kochiana and C. tomentosa L. as a synonym of C. tomentosa (L.) Murr. Sprengel (1828) regarded C. incana Roxb. as a valid species, but in his 1825 work he placed it in the synonymy of what he called "C. lanata" [= C. tomentosa].

It should perhaps be pointed out here that the C. tomentosa accredited to Thunberg in the synonymy given above is a synonym of C. longifolia Lam., that accredited to Bakhuizen van den Brink is in part C. arborea Roxb. and in part C. integerrima Champ., that accredited to Lamarck and to "L. ex Spreng." is C. candicans (Burm. f.) Hochr., that ascribed to "L. ex Moldenke" is C. erio-clona Schau., that ascribed to "Auct.", to Hooker & Arnott, to Willdenow, to "sensu auct. Japon.", to "sensu Matsum.", and to "sensu Matsum. & Hayata" is C. kochiana Mak., while that accredited to Murray, to "L. ex Willd.", and to "(L.) Santapau" is the true C. tomentosa (L.) Murr.

The C. cana ascribed to Dalzell & Gibson is a synonym of C. tomentosa (L.) Murr., that ascribed to Linnaeus, to Sprengel, and to Vahl is C. candicans (Burm. f.) Hochr., and that ascribed to Wallich is in part C. longifolia Lam. and in part C. pedunculata R. Br. The C. incana (Turcz.) Moldenke, also ascribed to "(F.) Moldenke" by certain authors, is actually C. cubensis Urb. The C. roxburghii ascribed to H. J. Lam, to Schauer, to "Wall. ex Schau.", to "Wall. ex Walp.", and to "sensu H. J. Lam" is C. kochiana Mak. The C. macrophylla var. sinensis C. B. Clarke is a synonym of C. nudiflora Hook. & Arn.

Watt (1889) tells us that C. macrophylla is "A tall shrub of Northern and Eastern India, found as far north as Hazára, and ascending the Himalaya to 6000 feet, and abundant in Bengal....In Hazára the heated leaves are applied to rheumatic joints (whence the name bá-pattra, from bá, rheumatism)." This Watt reference is cited by Prain (1963) as "E. D. c. 133" — 133 being a paragraph number! Groff also tells us that the species is "used in the pre-

paration of a medicine used for injuries" in Kwangsi, China. Datta (1965) states that the plant is found in village shrubberies in India; Prain (1903) asserts categorically that it is found "In all the provinces" of Bengal — presumably both Indian and Pakistani Bengal. Balakrishnan (1964) affirms that it grows naturally from Kashmir to Assam in northern India and to Pegu in Burma, ascending to 2000 meters altitude, its white fruit rendering it quite distinct from C. arborea Roxb., with its purplish-black fruit, and from C. tomentosa (L.) Murr. Maheshwari (1963) distinguishes it from C. longifolia Lam. by pointing out that in C. longifolia the leaves are "thinly stellate-pubescent; corolla more or less pubescent outside", while in C. macrophylla the leaves are "densely stellate-woolly beneath; corolla glabrous outside or with some hairs."

Bojer (1837) records C. macrophylla as cultivated in Mauritius and Humbert insists that the Madagascar record for the species is also based on cultivated material. It is therefore probable that the Réunion record given below is also from cultivated material, although the label of the specimen does not indicate this to be the case. I assume that the Brazilian record is also taken from cultivated material, even though, again, the label does not indicate such a fact.

Dahlgren (1938), for some reason unknown to me, places this genus and species in the Lamiaceae!

Common and vernacular names recorded for C. macrophylla include "bannu", "bá-pattra", "b'a-pattra", "bauna", "budhi ghasit", "budhi-ghasit", "daia", "daidogoro", "daya", "dea", "den", "denthur", "druss", "drúss", "grossblättrige Schönbeere", "mashandari", "mathara", "mattranja", "muttranja", "muttrunja", "muttura", "oon awn", "pattharman", "poko kwat tán", "shiwali", "sigye", "sumali", "súmáli", "thar", "tondi-teregam", "urnfruit beautyberry", and "urn-fruit tree". It should be noted that the name "shiwali" is also applied to C. arborea Roxb.

Alleged references to this species in Baden Powell, "Pb. Pr. 571", "Asiat. Res. 55: 233", and "Kanjilal For. Fl. 263" have not yet been verified by me.

Panigrahi and his associates (1964) record the species as common in Orissa; Rao (1964) records it from Uttar Pradesh; Stewart (1967) records it from Swat. Deb (1961) cites Deb 154 from Manipur. Santapau, in a letter to me dated February 16, 1948, says that this species "occurs in the Deccan, fide Clarke. The plant seems to be common in N. and E. India, only occasionally elsewhere; I have seen no specimens from Bombay Presidency". Kitamura (1959) cites his collections from Halchok, altitude 1500 meters, July 31, 1953, and from Arughat Bazar, altitude 624 meters, December 10, 1952, in Nepal, and gives the overall distribution of the species as "Himalaya, India, Burma, China: Yunnan, Szechuan, Kwangtung, Hainan; Siam, Indo-China, New-Guinea, Mascarenes, Reunion". Kapoor and his associates (1969) report the isolation of an alkaloid from C. macrophylla. Gillis 8574 was

grown from seed secured in northern India via "Fla. Fed. Gard. Clubs 328".

Chang (1951) cites G. Forrest 9190 and nos. 4736, 5717, 6374, 9511, 9576, 53291, 60639, 90752, 90986, 96332, & 155948 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters.

Material of Callicarpa macrophylla has been misidentified and distributed in herbaria under the names C. arborea Roxb., C. cana L., C. dentata Roxb., C. longifolia Vahl, C. nudiflora Hook. & Arn., C. reevesii Wall., and C. vestita Wall.

On the other hand, the Herb. Mus. Paris. s.n. [Coromandel], distributed as C. macrophylla, is actually C. arborea Roxb., Koorders 19498b [448] is C. caudata Maxim., C. Wright s.n. [Hong Kong] is C. integerrima var. serrulata Li, R. C. Ching 2009 is C. kochiana Mak., Ford s.n. [Hongkong] is the type collection of C. loboapiculata Metc., Herb. Univ. Delhi 270 is C. longifolia Lam., Nevin s.n. [Canton] is C. nudiflora Hook. & Arn., F. A. McClure 3038 [Herb. Canton Chr. Coll. 9591] is a cotype collection of C. rubella f. robusta P'ei, Fraser 122 and Simons 5699 are C. tomentosa (L.) Murr., and Koelz 13302 is Geunsia cumingiana (Schau.) Rolfe.

In all, 147 herbarium specimens and 8 mounted illustrations, including 2 photocopies, have been examined by me.

Additional citations: PAKISTAN: East Bengal: W. Griffith 6000 (T), 6040 (S). NEPAL: Bis Ram 570 (N); Pradham & Ihapa 4497 (W—2581488); Wallich s.n. [e Nepalia] (S). BHUTAN: R. Lister 28 (Bz—18084). SIKKIM: Kuntze 7208 (N). INDIA: Assam: Jenkins s.n. [Assam] (Bz—18080, Bz—18081); Koelz 26987 (M); Masters 696 (Bz—18077), s.n. [Assam] (Bz—18076, Bz—18085); Simons s.n. [Assam] (Bz—18078); Wallich 1832g (S). East Punjab: J. R. Drummond 26703 (Ca—244964), 26706 (Ca—244965). Kashmir: Meebold 161 (S); R. R. Stewart 2725 (N), 3725 (S). Khasi States: W. Griffith s.n. [Khasia hills] (Bz—18082). Madras: Yeshoda 488 (N). Uttar Pradesh: Afzal s.n. [9th Nov. 1929] (N), s.n. [16th Aug. 1930] (N); Ali 23 [Bot. Coll. 102] (N); Duthie 22445 (Ca—269792, Gg—127010); Gairola 80 (W—1347717); Goel s.n. [22nd Sept. 1929] (W—1716613); Kalaky s.n. [28th December 1930] (W—1719637), s.n. [8th August 1931] (W—1719637); Kharyal s.n. [Gola Tappar, January 1929] (S), s.n. [Lachiwala, August 1929] (S); Poovaliah s.n. [4-8-30] (N), s.n. [15-8-31] (N); Raizada 126 (N); U. Singh 375 (Dp—30709, La, N, S); R. R. Stewart 11148 (N); Vaid s.n. [20.6.49] (N). West Bengal: Biswas s.n. [Goke, 23/XII/1937] (N); Herb. Hort. Bot. Calcutt. s.n. [Goke, 23/XII/1937] (W—1759055), s.n. [Goke] (Bz—18075); King's Collector 126 (Na—16190); Kuntze 6491 (N, N); Kurz s.n. [19/9/68] (Bz—18086), s.n. [Chandernagore, 7/71] (W—803879); T. Thomson s.n. [Plan. Ganget. Sup.] (Ca—192884, S). State undetermined: H.

Falconer 748 (S); Kuntze 3600 [Turong Anambai] (N); Nath 76 [Bundana] (Ca--304517). BURMA: Upper Burma: Huk 58 (Bz--18088), s.n. [July 1891] (W--369328); Juan 646 (W--2213155); J. F. C. Rock 828 (W--1171492). Province undetermined: McLelland s.n. [Burmah] (Bz--18087). CHINA: Kwangsi: Ching 5717 (N), 6374 (N); G. W. Groff 10 [Herb. Canton Chr. Coll. 4050] (Ph); Stewart & Cheo 876 (Bz--17485, S). Kweichow: Esquirol 869 (N--photo); Séguin 243a (N--photo); Tsiang 6371 (N, S, W--1575040). Yunnan: A. Henry 9262 (N), 9262a (N), 9262b (W--456891). THAILAND: Hansen & Smitinand 11974 (Cp); Larsen, Santisuk, & Warncke 2774 (Ac); Winit Wanandorn 1152 (Bk). NEW GUINEA: Papua: C. E. Carr 11317 (N). CULTIVATED: Belgium: M. Martens s.n. [h. b. lov. 1841] (Br). Brazil: Campos Novaes 11278 [Herb. Com. Geog. & Geol. S. Paulo 5842] (Mi--photo, Sp--11278). California: La Rue s.n. [Citrus Exp. Sta., Riverside] (Ar--19789). Cuba: Ferras 20465 (Es). Florida: Gillis 8574 [Fairchild Trop. Gard. FG-58-719] (Z). France: Herb. Hort. Paris. s.n. [1820] (V); Herb. Schwägrichen s.n. (Mu--1435). Germany: Herb. Kummer s.n. [hort. Monac. 1846] (Mu--1437, Mu--1438, N--photo, Z--photo), s.n. [hort. Monac. 1865] (Mu--1436), s.n. [hort. Monac.] (Mu--1444, Mu--1445). Hawaiian Islands: Degener & Degener 28448 (N); A. F. Judd 158 (Bi); Judd, Bryan, & Neal s.n. [June 6, 1932] (Bi); Meebold s.n. [January 1940] (Bi). India: Herb. Hort. Bot. Calcutt. s.n. (Bz--18079, Bz--18083, E--photo, Ed, M, Mu--964, Mu--1000, Mu--1159, N--photo, X, Z--photo); Herb. Hort. Seramp. s.n. (Cp); Herb. Roxburgh s.n. (K); Jamison s.n. [Serampore] (Ed); Roxburgh 159 (Br), s.n. (K); Strachey & Winterbottom 1 (K), s.n. (Os); Voigt s.n. [H. B. Seramp.] (Cp, Cp, Cp); Wallich 1832/g (Mu--1434), 1832/L (K). Java: Bakhuizen van den Brink 765 (Bz--18074, N); Herb. Hort. Bot. Bogor. XI.G.91 (Bz), XI.G.91a (Bz--25795, Bz--26525, Bz, N), XI.G.92 (N), XI.G.92 & a (Bz--18073), XV.F.31 (Bz--26340, Bz, N), XV.F.31a (Bz--26347), XV.J.A.XXX.3 (Bz--26365, Bz--26366), XV.J.A.XXX.3a (Bz--26367, Bz), XV.J.A.XXX.4 (Bz--26368, N), s.n. (Bz--26348). Madagascar: Herb. Direct. Agric. 90 (P). Maryland: F. G. Meyer 4111 [U. S. Dept. Agr. Pl. Introd. 240796] (Bv). Mauritius: Bojer II. 88 (V). Réunion: L'Isle 243 (P, W--210572). LOCALITY OF COLLECTION UNDETERMINED: Blackburn s.n. (T); Herb. Mus. Bot. Stockholm 87 (S), s.n. (S).

CALLICARPA MACROPHYLLA var. *GRIFFITHII* C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885.

Bibliography: C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; Moldenke, Résumé 245. 1959; Moldenke, Résumé Suppl. 16: 9 & 18. 1968.

This variety differs from the typical form of the species in

being much branched and having leaves which are much smaller, fuscous-woolly, obscurely stellate beneath, and ultimately glabrate, according to Clarke (1885).

The type of the variety was collected by William Griffith (no. 6041) in Bhutan, where it appears to be endemic. Clarke says that it "Differs a good deal in habit from C. macrophylla, but connected by E. Nepal specimens collected by Sir J. D. H.[ooker]". The taxon is known to me only from the literature.

CALLICARPA MADAGASCARIENSIS Moldenke, Bull. Torrey Bot. Club 77: 391—392. 1950.

Bibliography: Moldenke, Bull. Torrey Bot. Club 77: 391—392. 1950; Kew. Revist. Sudam. Bot. 8: 169. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 40. 1953; Moldenke in Humbert, Fl. Madag. 174: 45—47, fig. VI 1 & 2. 1956; Moldenke, Résumé 155 & 444. 1959.

Illustrations: Moldenke in Humbert, Fl. Madag. 174: fig. VI 1 & 2. 1956.

Shrub, about 2 m. tall; branchlets and twigs very slender, grayish, very obtusely tetragonal or subterete, very densely short-pubescent with flavidous hairs when young, glabrescent in age; nodes not annulate; principal internodes often much abbreviated on twigs, 1—8 mm. long, or elongate to 3 cm. on branchlets; leaf-scars comparatively large and elevated, with prominent corky margins; leaves decussate-opposite, crowded at the tips of the twigs; petioles slender, 3—9 mm. long, very densely flavidous-pubescent; leaf-blades thin-chartaceous, dark-green above, lighter beneath, lanceolate or narrowly elliptic, 1.5—5.5 cm. long and 1—1.6 cm. wide during anthesis, acute or shortly acuminate at the apex, obtuse or rounded at the base, entire, densely short-pubescent or subvelutinous above, densely tomentellous with canescent-flavidulous hairs beneath; midrib slender, flat above, prominulous beneath; secondaries slender, about 5 per side, arcuate-ascending, flat or obscure above, very slightly prominulous beneath; vein and veinlet reticulation indiscernible above, mostly obscure beneath; inflorescence axillary and terminal, small, cymose, 1—1.5 cm. long and wide, the axillary cymes usually concentrated in the upper axils and appearing as though constituting part of a terminal one, few-flowered, densely short-pubescent with flavidous hairs throughout; peduncles very slender, 2—4 mm. long, flavidous-pubescent; pedicels filiform, 1 mm. long or less, flavidous-pubescent; bractlets linear, 1—2 mm. long, densely flavidous-pubescent; calyx campanulate, about 2.5 mm. long and wide, appressed-pubescent and more or less resinous-granular on the outside, 4-ribbed, its rim shortly 4-dentate; corolla hypocrateriform, its tube about 4 mm. long, lightly puberulent and resinous-granular on the outside above the calyx, its lobes 3—4 mm. long, resinous-granular on the back, lightly pilosulous on the margin and in a median band on the inside; stamens and pistil exserted; fruiting-calyx and fruit not known.

The type of this endemic species was collected by André Seyrig

(no. 782) at an altitude of 750 meters, north of Ampandrandava, between Bakily and Tsivory, Madagascar, in December, 1943, and is deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris. The species is known only from the original collection. In all, 3 herbarium specimens, including the type, and 3 mounted photographs have been examined by me.

Citations: MADAGASCAR: Seyrig 782 (F--photo of type, N--iso-type, N--photo of type, P--type, P--isotype, Z--photo of type).

CALLICARPA MAGNIFOLIA Merr., Philip. Journ. Sci. Bot. 20: 437. 1922.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 20: 437. 1922; E. D. Merr., Enum. Philip. Pl. 3: 386. 1923; Quisumb. & Merr., Philip. Journ. Sci. Bot. 37: 196. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 37. 1929; Moldenke, Alph. List Common Vern. Names [1]. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87. 1942; Moldenke, Phytologia 2: 95. 1945; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 141 & 177. 1949; Moldenke, Résumé 182 & 444. 1959.

Shrub or small tree; branches terete or somewhat compressed at the nodes, pale-grayish, glabrous, about 6 mm. in diameter; branchlets reddish-brown, densely fulvous-tomentose with rather soft plumose and stellate hairs; leaves decussate-opposite; petioles about 5 cm. long, densely tomentose; leaf-blades subcoriaceous, broadly elliptic-ovate, 22--27 cm. long, 17--20 cm. wide, shortly and broadly acuminate at the apex, entire along the margins or very obscurely and remotely denticulate near the apex, broadly rounded or sometimes subacute at the base, olivaceous, glabrous and shiny above, paler and densely fulvous-tomentose with rather soft plumose and stellate hairs beneath, not at all glandulose; secondaries about 10 per side, very prominent; tertiaries subparallel, distinct; cymes in the axils of the fallen leaves, about 6 cm. long and to 9 cm. wide in fruit; bractlets linear, 3--5 mm. long, pubescent; flowers not known; fruiting-calyx membranous, cupuliform, about 3 mm. long, the rim shortly 4-lobed; fruit globose, about 3 mm. in diameter, glabrous, nearly surrounded by the densely fulvous-tomentose greatly enlarged disk which is subglobose and to 10 mm. in diameter.

The type of this remarkable species was collected by Maximo Ramos and Gregorio E. Edaño [Herb. Philip. Bur. Sci. 37563] in forests at an altitude of about 1200 meters on Mount Masingit, in Kalinga Subprovince, Luzon, Philippine Islands, on February 17, 1920, and was deposited in the herbarium of the Bureau of Science at Manila, but is now destroyed. The native vernacular name of "agnai" is recorded for the plant.

Merrill (1922) says that "This species is remarkable for its greatly enlarged, densely fulvous-tomentose disk which surrounds and nearly incloses the fruit, a character that is unknown to me for any other described species of the genus. It is further remarkable for its unusually large leaves which are eglandular and densely tomentose on the lower surface." Quisumbing & Merrill

(1928) comment that the species is apparently related to and very similar to C. pachyclada Quisumb. & Merr.

Callicarpa magnifolia is known to me only from the literature referred to above.

CALLICARPA MAINGAYI King & Gamble, Kew Bull. Misc. Inf. 1908: 106. 1908.

Synonymy: Callicarpa maingaya King & Gamble apud Elm., Leaf1. Philip. Bot. 3: 866, sphalm. 1910. Callicarpa maingayi King & Gamble apud Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 21, in syn. 1921.

Bibliography: S. Kurz, Forest Fl. Brit. Burma 2: 274 & 589. 1877; King & Gamble, Kew Bull. Misc. Inf. 1908: 106. 1908; King & Gamble, Journ. Roy. Asiat. Soc. Bengal 74 (2), extra no.: 802 & 804. 1908; King & Gamble, Mat. Fl. Malay Penins. 21: 1012 & 1014. 1909; Elm., Leaf1. Philip. Bot. 3: 866. 1910; Prain, Ind. Kew. Suppl. 4, pr. 1, 34. 1913; E. D. Merr., Philip. Journ. Sci. Bot. 12: 298. 1917; H. J. Lam, Verbenac. Malay. Arch. 47, 49, 63, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 21. 1921; H. N. Ridl., Fl. Malay Penins. 2: 614 & 615. 1923; Calder, Narayanaswami, & Ramaswami, Rec. Bot. Surv. India 11: 24. 1926; Fletcher, Kew Bull. Misc. Inf. 1938: 411 & 413. 1938; Moldenke, Suppl. List Common Vern. Names 2, 6, 14, 21, & 23. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 59--61 & 87. 1942; Moldenke, Phytologia 2: 95. 1945; H. N. & A. L. Moldenke, Pl. Life 2: 71. 1948; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 137--139 & 177. 1949; Moldenke, Phytologia 4: 76 (1952) and 6: 215. 1958; Prain, Ind. Kew. Suppl. 4, pr. 2, 34. 1958; Anon., Kew Bull. Gen. Index 1929-1956, p. 59. 1959; Moldenke, Résumé 177, 179, & 444. 1959; Moldenke, Phytologia 14: 37. 1966; Moldenke, Résumé Suppl. 14: 7. 1966.

Shrub, small or medium-sized tree, or climber; branches minutely golden-brown stellate-tomentose when young or covered with a yellowish scaly scurf; branchlets stout, obtusely tetragonal; leaves decussate-opposite, often inequilateral; petioles stout, 4-5 cm. long, canaliculate above; leaf-blades coriaceous or thin-coriaceous, elliptic to elliptic-obovate or obovate, 15--30 cm. long, 7.5--15 cm. wide, rounded and very shortly acute or acuminate at the apex, entire or subentire to undulate along the margins with minute denticulations at the ends of the larger veins, narrowed or rounded and then somewhat cuneate at the base, glossy-green and glabrous on the upper surface except for the midrib and secondaries on young leaves, ashy-gray beneath and minutely golden-brown stellate-tomentose or rugose and very minutely appressed stellate-pubescent, the venation on all impressed above and strongly elevated beneath; midrib stout; secondaries 10--12 pairs, issuing at an angle of about 75° from the midrib, antrorsely curvate, anastomosing near the margins; tertiaries fairly regular, transversely joining the secondaries; veinlet reticulation connecting the tertiaries; inflorescence minutely golden-brown stellate-tomentose; cymes 8--9 cm. long and to 15 cm. wide or only

5--8 cm. long and wide, compound, widely dichotomous, many-flowered; peduncles stout, short, flattened, 2.5--4 cm. long; cyme-branches also flattened when dry; bractlets linear-subulate, very small; pedicels slender, 1--2.5 mm. long; calyx hemispheric, 1--1.5 mm. long, tawny stellate-tomentose outside, glabrous within, the rim denticulate with 4 minute teeth; corolla white to yellowish or greenish-yellow, scurfy, its tube subcylindric, 1--1.5 mm. long, very densely stellate-tomentose outside, glabrescent within, the lobes short, about 1 mm. long, rounded at the apex, villous within; stamens inserted near the base of the corolla-tube; filaments 4.5 mm. long; anthers glandular-punctate on the back; style slender; stigma capitate; ovary villous; drupes small, globose, black, to 1.5 mm. in diameter.

This species was based by King and Gamble on H. N. Ridley 2787 from Selangor and on Derry 1005 and Maingay 1192 -- in whose honor it was named -- from Malacca, as cotypes. These authors say in their original description (1908) "In Kew Herbarium, Maingay's specimen has been placed under C. arborea, but the species differs in many respects. The venation of the leaves is very different, as is the tomentum of much smaller stellate hairs; the leaves are nearly blunt; the tube of the corolla much longer, and its lobes much shorter; and we have no hesitation in describing it as a new species." In their key they distinguish the two species about as follows:

1. Leaf-blades long-acuminate at the apex, the tomentum thick; cymes dense; corolla-tube only about .075 inch long, merely puberulous.....C. arborea Roxb.
- 1a. Leaf-blades obtuse or very shortly acuminate at the apex, the tomentum thin; cymes spreading; corolla-tube .1 inch long, stellate-pubescent.....C. maingayi King & Gamble.

Lam (1919) distinguishes the present taxon from C. subalbida Elm. as follows:

1. Corolla densely stellate-hairy outside, the lobes pubescent within.....C. maingayi.
- 1a. Corolla glabrous outside, the lobes glabrous within.....C. subalbida.

Ridley (1923) differentiates it from two closely related Malay-an species as follows:

1. Leaf-blades densely tomentose beneath; corolla violet.....C. arborea.
- 1a. Leaf-blades thinly tomentose beneath; corolla greenish.....C. maingayi.
- 1b. Leaf-blades white beneath with brown-scurfy veins.....C. furfuracea Ridl.

He cites a Derry s.n. from Hulu Chembong and a Cantley s.n. from Selangor, and says "Selangor, Sempang Track, Semangkok Pass; Ulu Gombak Road; Langat. Native names: Poko chulak; tuto putih. Use: wood for making fiddles." Other common names recorded for the plant are "balek angin laut", "chulak", "hu khawi khao", "mëndapor", "tampang bësi, "tulo", "tutok puteh", and "tutor".

The species has been found scattered in evergreen jungles at 100 meters altitude, flowering in April, May, and November. The corollas are described as "white" on Bunkird 85 and Singapore Field No. 16051 and as "yellowish" on Snan 210; Ridley calls them "greenish".

It is worth noting that Bakhuizen van den Brink (1921) regarded C. maingayi as a synonym of C. tomentosa (L.) Murr., while Fletcher (1938) regarded C. tomentosa var. typica Bakh. as a synonym of C. maingayi.

In all, 7 herbarium specimens of C. maingayi and 2 mounted photographs have been examined by me.

Citations: THAILAND: Bunkird 85 [Herb. Roy. Forest. Dept. 3284] (Sm); Snan 210 [Herb. Roy. Forest. Dept. 12090] (Z); Winit Wanan-dorn 6021 (N). MALAYA: Pahang: Holttum 24803 (Bz—18097, Bz—18098, N, N—photo, Z—photo); Singapore Field No. 16051 (Ca—255309).

CALLICARPA MEGALANTHA Merr., Philip. Journ. Sci. Bot. 10: 71—72. 1915.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 10: 71—72. 1915; H. J. Lam, Verbenac. Malay. Arch. 48, 50, 75, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 13. 1921; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; E. D. Merr., Enum. Philip. Pl. 3: 386. 1923; Moldenke, Alph. List Common Vern. Names 23. 1939; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87. 1942; Moldenke, Phytologia 2: 95. 1945; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 141 & 177. 1949; Moldenke, Résumé 182 & 444. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960.

Tree, about 10 m. tall, most of its parts (except the upper surface of the adult leaves) more or less yellow-glandular and stellate-plumose-pubescent, the indumentum dark-brown or dark grayish-brown in color; branches terete, the younger ones more or less compressed, yellow-glandulose, the younger parts densely stellate-plumose-pubescent; branchlets brown or gray, stellate-hairy, densely glandulose; leaves decussate-opposite; petioles 2—2.5 cm. long, very densely stellate-pubescent with brown or gray hair, densely glandulose; leaf-blades subcoriaceous, oblong to oblong-ovate, 12—16 cm. long, 5—6 cm. wide, about equally narrowed to the acuminate apex and the acute base, entire along the margins, more or less stellate-pubescent above when young, becoming glabrous or nearly glabrous in age, brownish-olivaceous and slightly shiny above, paler and with numerous scattered pale-yellow shiny glands beneath and also stellate-pubescent, more densely so on the midrib and secondaries and with only scattered stellate hairs on the lamina; secondaries about 9 per side, upwardly curvate, anastomosing, prominent beneath; inflorescence cymose, in the upper leaf-axils, solitary, 7—8 cm. in diameter, densely many-flowered, dichotomously branched; peduncles stout, about 8 cm. long, these along with the bracts, bractlets, and

calyxes densely stellate-plumose-pubescent, the indumentum almost obscuring the scattered shiny pale-yellow glands; bracts oblanceolate-spatulate, 6--8 mm. long; bractlets similar but much smaller; calyx somewhat infundibular, about 3 mm. long, its rim equally 4-toothed or -lobed, the lobes short and acute; corolla white, 6--7 mm. long, sparingly glandulose outside with small yellow shiny glands, the lobes 4, subequal, oblong-ovate, 3--3.5 mm. long, broadly rounded at the apex, sparingly stellate-pubescent in lines and glandulose externally on the median portion; filaments 7--8 mm. long; anthers ovoid, about 1.2 mm. long, somewhat glandulose on the back; ovary ovoid, very densely covered with small shiny pale-yellow glands.

The type of this species was collected by Richard Crittenden McGregor [Philip. Bur. Sci. 19687] on Mount Polis, in Ifugao Subprovince, Luzon, Philippine Islands, and was deposited in the herbarium of the Bureau of Science at Manila, but is now destroyed. Merrill (1915) comments that the species is "Probably most closely allied to Callicarpa subglandulosa Elm., but differing from that species in many characters. Callicarpa megalantha is remarkable for its comparatively large flowers which are indicated by the collector as being white, a color otherwise unknown or at least very rare in the genus, its long-peduncled cymes, and its dark-brown or dark grayish-brown indumentum."

The species appears to be endemic to Luzon. Lam (1919) also avers that "Its affinity is with C. subglandulosa [now known as Geunsia pentandra (Roxb.) Merr.]; it has, however, leaves with an attenuate base, whilst C. subglandulosa has leaves with a somewhat rounded base." A common name recorded for it is "palayan". It has been found blooming in February and September, and fruiting in September.

Bakhuizen van den Brink (1921) reduces the species to synonymy under what he calls C. pentandra var. typica f. hexandra Bakh. [= Geunsia hexandra (Teijsm. & Binn.) Koord.]. Material has been misidentified and distributed in herbaria under that name. In all, 5 herbarium specimens have been examined by me.

Citations: PHILIPPINE ISLANDS: Luzon: Quisumbing s.n. [Herb. Philip. Bur. Sci. 84641] (N); Ramos & Edayo s.n. [Herb. Philip. Bur. Sci. 37718] (Bz--18555, W--1260405), s.n. [Herb. Philip. Bur. Sci. 40363] (Bz--18554, W--1261454).

CALLICARPA MEMBRANACEA Chang, Act. Phytotax. Sin. 1: 306. 1951.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 300, 306, & 312. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

Chang (1951) describes this species as follows: "Frutex circ. 1 m altus. Ramuli pallidi lenticellati glabrescentes. Folia membranacea anguste oblonga, 10--15 cm longa, 3--4.5 cm lata, utrinque glabra, supra viridia subtus pallidiora sparse punctata, apice longe acuminata vel subcaudata, basi cuneata vel acuta, margine in parte 3/4 superiore serrata, serraturis in utroque

latere 16--24 inter se 3--7 mm distantibus; nervi laterales utrinsecus 8--11 subtus elevati; petioli circ. 5 mm longi glabri. Cymae axillares bis dishotomae, 1.5 cm diametro, circ. 14-florae, glabrae vel sparsissime stellato-puberulae; pedunculi 5--8 mm longi graciles; bracteae et bracteolae subulatae glabrae; calyx 1--1.5 mm longus truncatus glaber vel sparsissime stellato-puberulus, lobis inconspicuis; corolla glabra, tubo 3 mm longo, lobis 1 mm longis; stamina exserta, filamentis 3--4 mm longis, antheris 1.3 mm longis, poro apicali dehiscentibus; ovarium punctatum, stylo staminibus longiore, stigmate paulo bifido. Fructus roseus 3 mm diametro."

The species is based on R. C. Ching 6130, collected in 1928 in Kwangsi, China, and deposited in the herbarium of the Botanical Institute of Sunyatsen University, Canton, China. Chang cites also S. H. Chun 2800 from Hunan and compares the species (in Chinese) with C. brevipes (Benth.) Hance.

CALLICARPA MERRILLII Moldenke, Bull. Torrey Bot. Club 60: 55. 1932.

Synonymy: Callicarpa lancifolia Merr., Philip. Journ. Sci. Bot. 10: 70--71. 1915 [not C. lancifolia Millsp., 1906, nor Pav., 1936, nor Sessé & Moc., 1940]. Callicarpa caudata var. simplicipuberula H. J. Lam, Verbenac. Malay. Arch. 61. 1919.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 10: 70--71. 1915; H. J. Lam, Verbenac. Malay. Arch. 46, 54--55, 61, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; E. D. Merr., Enum. Philip. Pl. 3: 385. 1923; Moldenke, Bull. Torrey Bot. Club 60: 55. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Alph. List Common Vern. Names 17, 23, & 30. 1939; Moldenke, Prelim. Alph. List Invalid Names 11. 1940; Moldenke, Carnegie Inst. Wash. Publ. 522: 199. 1940; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87. 1942; Moldenke, Alph. List Invalid Names 9. 1942; Moldenke, Phytologia 2: 95. 1945; H. N. & A. L. Moldenke, Pl. Life 2: 72. 1948; Moldenke, Alph. List Cit. 2: 462 (1948) and 3: 723 & 841. 1949; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 141 & 177. 1949; Moldenke, Résumé 182, 244, & 444. 1959; Prain, Ind. Kew. Suppl. 4, pr. 2, 43. 1960; Moldenke, Phytologia 13: 431 & 433 (1966) and 14: 142 & 143. 1966; Moldenke, Résumé Suppl. 14: 6 (1966) and 15: 11. 1967; Moldenke, Phytologia 15: 20 (1967) and 16: 451 & 452. 1968; Moldenke, Résumé Suppl. 16: 12. 1968; Moldenke, Phytologia 21: 33 & 109. 1971.

Shrub, 1--4 m. tall; branches terete, slender, subglabrous or more or less ferruginous-stellate-pubescent, the younger ones and branchlets densely stellate-pubescent and with scattered longer sparingly plumose-branched hairs intermixed; leaves decussate-opposite; petioles 5--8 mm. long, densely stellate-tomentose; leaf-blades chartaceous, lanceolate to narrowly oblong-lanceolate, 15--20 cm. long, 3--5 cm. wide, narrowed above to the long and slender often subfalcate caudate-acuminate apex, serrate-dentate with distinct gland-tipped teeth along the margins, narrowed below to the obtuse and usually slightly inequilateral base, usually olivaceous

above when dry and eglandular with scattered short simple hairs, usually somewhat paler and sparingly stellate-tomentose beneath and minutely glandular or usually only with simple hairs beneath; secondaries 10 or 11 per side, distinct, arcuate-ascending, anastomosing; inflorescence cymose, the cymes axillary, solitary, 2--4 cm. long, pedunculate, dichotomous, rather lax and open, many-flowered, the branches divaricate, rather densely pubescent with simple and stellate hairs intermixed, sometimes with plumose hairs; bractlets small, linear, pubescent; calyx about 1 mm. long, sparingly hirsute-pubescent with short straight simple hairs, the rim obscurely or scarcely and subequally 4-toothed; corolla pink or lilac, glabrous, the tube about 2 mm. long, glabrous, the lobes 4, orbicular-ovate, about 1 mm. long, rounded at the apex; stamens little exerted; filaments 4 mm. long; anthers 0.5 mm. long; style slender, 5.5 mm. long, slightly thickened into the stigma at the apex; fruit white or dark-pink.

The type of this species was collected by Maximo Ramos (Herb. Philip. Bur. Sci. 11078) on the island of Cebu, Philippine Islands, in March, 1912, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, but is now destroyed. The corolla is described as "pink" on R. S. Williams 2306 and as "yellow" [probably an error] on Herb. Philip. Bur. Sci. 44601. E. D. Merrill 8115 has extra large leaf-blades.

Merrill (1915) notes that "The species has been confused with Callicarpa caudata Maxim., and C. longifolia Lam., and is manifestly allied to the former, differing in its very different indumentum. It is apparently more closely allied to C. stenophylla Merr., than to C. caudata, but is distinguished from the former by its broader leaves. Among the extra-Philippine forms it is apparently most closely allied to Callicarpa longifolia Lam., differing in its indumentum, shape of its leaves, and in details of its flowers." He cites as typical material of C. merrillii the following collections: Basilan: DeVore & Hoover 41, Hallier s.n. Mindanao: Mrs. Clemens s.n. [Camp Keithley], Fénix s.n. [Herb. Philip. Bur. Sci. 15802], E. D. Merrill 8115, C. B. Robinson s.n. [Herb. Philip. Bur. Sci. 11802], R. S. Williams 2307. Mindoro: E. D. Merrill 5556. Ticao: W. W. Clark s.n. [Herb. Philip. Forest Bur. 2534].

In my opinion, the species is most closely related to C. caudata Maxim. Lam (1919) agrees, saying "Its affinity is with C. caudata, from which it differs, however, by the obtuse base of the leaves, and in some other points." Actually, the simple hairs on the lower leaf-surface, seen very plainly on Elmer 10375 and on Herb. Philip. Bur. Sci. 37388, 38816, & 44601, constitute the quickest and easiest way to distinguish C. merrillii from C. caudata. In the latter species the pubescence is stellate everywhere. Callicarpa merrillii — named in honor of Elmer Drew Merrill (1876—1956), who first recognized it — is also related to C. stenophylla Merr. and, more

distantly, to C. longifolia Lam. It has been found growing along small brooks in forests at low altitudes, flowering from April to June and August to December, and fruiting in February, April, June, and August to December. Vernacular names recorded for it are "katonal", "palis", and "tigau". Bakhuizen van den Brink (1921) reduces it to synonymy under what he calls C. cuspidata Roxb. and cites the Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 44601] collection. I regard C. cuspidata Roxb. as conspecific with C. pedunculata R. Br.

It should be noted here that the C. lancifolia of Millspaugh, referred to in the synonymy above, is a valid West Indian species, while that of Pavon and of Sessé & Mocino is C. acuminata H.B.K.

Lam (1919) based his C. caudata var. simplicipuberula on "Merrill 10375" from Dumaguete in the Cuernos Mountains on eastern Negros, Philippine Islands, collected in June, 1908, but this is certainly an error in transcription for Elmer 10375. He describes the variety as "folia vix denticulata, subtus pilis simplicibus vestita", with young fruits in June.

Material of C. merrillii has been misidentified and distributed in herbaria under the names C. caudata Maxim., C. cuspidata Roxb., and C. longifolia Lam. On the other hand, the W. W. Clark s.n. [Herb. Philip. Forest Bur. 2534], McClure 15899, Mearns & Hutchinson 4755, M. Ramos s.n. [Herb. Philip. Bur. Sci. 43310], Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49295], Ramos & Pasgasio s.n. [Herb. Philip. Bur. Sci. 34775], and R. S. Williams 2307, distributed as C. merrillii, are actually C. caudata Maxim.

In all, 19 herbarium specimens, including type material of one of the names involved, have been examined by me.

Citations: PHILIPPINE ISLANDS: Basilan: DeVore & Hoover 41 (W-449518). Luzon: F. Manuel s.n. [Herb. Philip. Forest Bur. 23489] (W-1376041); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 44601] (B, Bz-17515, Ca-257638, N). Mindanao: Fénix s.n. [Herb. Philip. Bur. Sci. 15802] (W-900327); Mearns & Hutchinson s.n. [May 1906] (N); E. D. Merrill 8115 (W-901911); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 37388] (Bz-17522, W-1260271); C. B. Robinson s.n. [Herb. Philip. Bur. Sci. 11802] (W-714476); R. S. Williams 2307 (W-707892). Mindoro: M. Ramos s.n. [Herb. Philip. Bur. Sci. 38816] (Bz-17521), s.n. [Herb. Philip. Bur. Sci. 39816] (W-1261106). Negros: Elmer 10375 (Bz-17524, N, W-705853). Ticao: W. W. Clark s.n. [Herb. Philip. Bur. Sci. 2534] (W-626216).

CALLICARPA MICRANTHA Vidal, Phan. Cuming. Philip. 134 & 187-188. 1885.

Bibliography: Vidal y Soler, Phan. Cuming. Philip. 134 & 187-188. 1885; Vidal y Soler, Rev. Pl. Vasc. Filip. 208. 1886; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; H. J. Lam, Verbenac. Malay. Arch. 47, 59, & 362. 1919; Bakh. in Lam & Bakh.,

Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; E. D. Merr., Enum. Philip. Pl. 3: 386. 1923; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 141 & 177. 1949; Moldenke, Résumé 183 & 444. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Moldenke, Phytologia 14: 142 (1966), 14: 225, 228, & 230 (1967), 15: 21 (1967), and 21: 36. 1971.

Shrub, 3 m. tall; trunk 10 cm. in diameter; branchlets slender, round, stellately farinose or tomentose; leaves decussate-opposite; petioles 4 mm. long; leaf-blades chartaceous, ovate-lanceolate or lanceolate, 6 cm. long, 2 cm. wide, acutely acuminate at the apex, serrate along the margins except near the base, acute at the base, more or less densely pubescent with simple hairs above, stellate-tomentose and glandulose beneath; secondaries 6—8 pairs; inflorescence stellate-farinose or -tomentosa, the cymes small, 2 cm. long; peduncles 5—10 mm. long; calyx 1—1.5 mm. long, somewhat stellate-pubescent and glandulose, its rim with 4 subacute deltoid teeth; corolla white or violet-pink, 3 mm. long, sparsely pubescent, with 4 lines of glands along the tube and on the lobes, the lobes 1—1.5 mm. long; stamens yellow, exserted, 4—4.5 mm. long; anthers ellipsoid, densely glandulose on both sides; style 5.5 mm. long; stigma capitate; ovary densely glandular on the upper half, glabrous on the lower half; fruiting-calyx and fruit not known.

The type of this species was collected by Hugh Cuming (no. 1165) in the province of Albay, Luzon, Philippine Islands. This is the only collection cited by Vidal y Soler on page 134 of his work (1885), where he designated the binomial as "n. sp." On pages 187—188 he adds "Herb. Prop. 1641 Prov. Abra". Lam (1919) cites a Cuming s.n. from Luzon, deposited as sheet number 908. 158—383 in the Rijksherbarium at Leiden, as well as a "Ccm. d. 1. fl. for. d. Fil. no. 1641, Abra". He also cites, with a question, a "Teysmann, H. Bog. no. 8942" from Tanini, Timor, and notes "The doubtful specimen: Korthals in H. L.—B. sub no. 908. 265—958, gives no locality".

Bakhuizen van den Brink (1921) reduces this species to synonymy under what he calls C. cuspidata Roxb. I regard Roxburgh's name as belonging in the synonymy of C. pedunculata R. Br.

It is not at all certain that C. micrantha may not prove, after all, when type material is available for study, to be conspecific with some other taxon. The Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45614], distributed as C. micrantha, matches perfectly the type collection of C. elegans Hayek and therefore is regarded by me as representing the latter species, while Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46955] is C. formosana f. angustata Moldenke. Callicarpa micrantha actually is a taxon known to me only from the literature listed above. It represents only one of the many problems that still must be solved before a formal monograph of the genus, with a key to accepted taxa, can be pub-

lished.

CALLICARPA MOLLIS Sieb. & Zucc., Fl. Jap. Fam. Nat. 526. 1844
[not C. mollis Koord., 1966, nor Matsumura, 1922, nor Req.,
1839, nor Shirasawa, 1949, nor Willd., 1840].

Emended synonymy: Callicarpa zollingeriana Schau. in A. DC.,
Prodr. 11: 640. 1847. Callicarpa farinosa Sieb. ex Miq., Ann.
Mus. Lugd.-Bat. 2: 99, in syn. 1865 [not C. farinosa Roxb., 1885].
Callicarpa farinosa Sieb. & Zucc., in herb. Callicarpa mollis
var. mollis Mizushima, in herb.

Bibliography: D. Dietr., Syn. Pl. 1: 428. 1839; Sieb. & Zucc.,
Fl. Jap. Fam. Nat. 526. 1844; Sieb. & Zucc., Abhand. Math.-phys.
Cl. Königl. Baier. Akad. Wiss. Münch. 4 (3): 155—156. 1846;
Sieb. & Zucc., Fl. Jap. Fam. Nat. 2: 155—156. 1846; Schau. in
A. DC., Prodr. 11: 640. 1847; Walp., Ann. Bot. Syst. 3: 237.
1852; A. Gray in M. C. Perry, Narr. Exped. China Seas & Japan 2:
316. 1856; Miq., Ann. Mus. Lugd.-Bat. 2: 99. 1865; Miq., Prol.
Fl. Jap. 31. 1866; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870;
Franch. & Savat., Enum. Pl. Jap. 1: 359. 1875; Lauche, Deutsche
Dendrol., ed. 2, 151. 1883; Maxim., Mém. Biol. 12: 504—505.
1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl.
Sin. 2]: 254. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew., pr.
1, 1: 386. 1893; Tasiro, Bot. Mag. Tokyo 8: 109. 1894; Shirasawa,
Bull. Coll. Agric. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.]
269, pl. 14 [Tafel 10], fig. 8. 1895; Briq. in Engl. & Prantl,
Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Koord., Meded. Lands
Plant-tuin Buitenz. 19: 558. 1898; J. Matsum., Bot. Mag. Tokyo
13: 114. 1899; Kuroiwa, Bot. Mag. Tokyo 14: 126. 1900; W. P.
Wright in Cassell, Dict. Pract. Gard., ed. 1, 1: 156. 1902; Beis-
sner, Schelle, & Zabel, Handb. Laubh. 425. 1903; Rehd. in L. H.
Bailey, Cycl. Amer. Hort. 1: 217. 1906; W. P. Wright in Cassell,
Dict. Pract. Gard., ed. 2, 1: 156. 1907; Shirasawa, Nippon Shin-
rin Jumoku Dzufu [Ic. Ess. Forest. Jap.] 2: pl. 70. 1908; Nakai,
Fl. Kor. 2: 134. 1909; Mak., Bot. Mag. Tokyo 24: 28—29. 1910; C.
K. Schneid., Ill. Handb. Laubholz. 2: 587, 591, & 593, fig. 382
g—i & 385 b—g. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 529.
1912; Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 629. 1914; Na-
kai, Fl. Quelp. Isls. 76. 1915; W. Trelease, Wint. Bot., ed. 1,
331. 1918; H. J. Lam, Verbenac. Malay. Arch. 51, 92, & 362. 1919;
E. H. Wils., Journ. Arnold Arb. 1: 183. 1920; Bakh. in Lam &
Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 11 & 24. 1921; Nakai,
Bot. Mag. Tokyo 36: 22. 1922; Nakai, Trees & Shrubs Indig. Jap.,
ed. 1, 338. 1922; Nakai, Fl. Sylv. Kor. 14: 31—33 & 133, pl. 9.
1923; Mak., Ill. Fl. Jap. [894]. 1924; Sakaguchi, Gen. Ind. Fl.
Okin. 18. 1924; W. Trelease, Wint. Bot., ed. 2, 333. 1925; Rehd.,
Man. Cult. Trees, ed. 1, 776. 1927; Nakai in Nakai & Koidz.,
Trees & Shrubs Indig. Jap., ed. 2, 1: 456—458, fig. [217]. 1927;
Masam., Prel. Rep. Veg. Yak. 115. 1929; Stapf, Icon. Bot. Ind.
Lond. 1: 526. 1929; Mak. & Nemoto, Fl. Jap., ed. 2, 994. 1931;
Mak., Gensyoku Yagai-shokubutu [Nature-Col. Wild Pl.] 4: 281.
1933; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illustr. Album]

1593. 1933; Crevost & Pételot, *Bull. Econ. Indo-Chine* 37: 1290. 1934; Masam., *Fl. & Geo. Yakus.* 387. 1934; Moldenke in Fedde, *Repert. Spec. Nov.* 39: 295, 297, & 298 (1936) and 40: 38, 40, 43, 86, 115—116, 120, & 125. 1936; Nemoto, *Fl. Jap. Suppl.* 622. 1936; Moldenke, *Alph. List Common Vern. Names* 16, 22, & 33. 1939; Moldenke, *Geogr. Distrib. Avicenn.* 36. 1939; Mak., *Ill. Fl. Nippon* fig. 562. 1940; Moldenke, *Prelim. Alph. List Invalid Names* 10, 12, & 13. 1940; Moldenke, *Carnegie Inst. Wash. Publ.* 522: 199. 1940; Rehd., *Man. Cult. Trees*, ed. 2, pr. 1, 803, 804, & 932. 1940; Worsdell, *Ind. Lond. Suppl.* 1: 160. 1941; Moldenke, *Known Geogr. Distrib. Verbenac.*, ed. 1, 57, 58, 71, & 87. 1942; T. H. Everett, *Cat. Hardy Trees & Shrubs* 16. 1942; Moldenke, *Alph. List Invalid Names* 9—11. 1942; Moldenke, *Phytologia* 2: 95. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 2, 1: 386. 1946; Moldenke, *Bol. Soc. Venez. Cienc. Nat.* 11: 49. 1947; Hara, *Enum. Sperm. Jap.* 1: 185. 1948; H. N. & A. L. Moldenke, *Pl. Life* 2: 90. 1948; Moldenke, *Alph. List Cit.* 2: 490 & 577 (1948) and 4: 984, 1081, 1145, 1224, & 1289. 1949; Rehd., *Bibliog. Cult. Trees* 584. 1949; Moldenke, *Known Geogr. Distrib. Verbenac.*, ed. 2, 133, 134, 157, & 177. 1949; Moldenke, *Phytologia* 3: 139 (1949) and 3: 380. 1950; H. N. & A. L. Moldenke, *Anal. Inst. Biol. Mex.* 20: 4. 1950; W. J. Bean, *Trees & Shrubs Hardy Brit. Isles*, ed. 7, 1: 334. 1950; W. J. Bean in Chittenden, *Roy. Hort. Soc. Dict. Gard.* 1: 358 & 359. 1951; Moldenke, *Phytologia* 4: 75. 1952; Masam., *Sci. Rep. Kanazawa Univ.* 4 [Enum. Trachy. Jap. 7]: 46. 1955; Hara, *Distrib. Maps Flow. Pl. Jap.* 51. 1958; Moldenke, *Am. Midl. Nat.* 59: 335. 1958; Krüssmann, *Handb. Laubgeh.* 1: 254 & 255. 1959; Hara, *Outline Phytogeog. Japan* 1 & 34. 1959; Moldenke, *Résumé* 171, 172, 214, 243, 245, 248, 427, & 444. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, pr. 3, 1: 386. 1960; Krüssmann in Encke, *Pareys Blumengärtn.*, ed. 2, 2: 446. 1960; Kitamura & Okamoto, *Col. Illustr. Trees & Shrubs Japan* 220. 1960; Rehd., *Man. Cult. Trees*, ed. 2, pr. 9, 803, 804, & 932. 1960; Moldenke, *Résumé Suppl.* 3: 18 (1962) and 4: 8. 1962; Li, *Morris Arb. Bull.* 14: 3, 4, & 7. 1963; Ohwi, *Fl. Jap.* 764 & 998. 1965; Griffith & Hyland, *U. S. Dept. Agr. Pl. Inventory* 164: 197 & 229. 1966; Moldenke, *Phytologia* 13: 431 & 433 (1966), 14: 53, 140, & 142 (1966), 14: 254 (1967), and 15: 30. 1967; Hyland, *U. S. Dept. Agr. Pl. Inventory* 168: 49. 1967; Moldenke, *Phytologia* 16: 377 & 386. 1968; Moldenke, *Résumé Suppl.* 16: 17 & 18 (1968) and 17: 8. 1968; K. Sugawara, *Ecolog. Rev.* 17: 213. 1969; Hyland, *U. S. Dept. Agr. Pl. Inventory* 173: 60. 1969; Moldenke, *Phytologia* 21: 35, 41, 42, 45, & 154. 1971.

Illustrations: Lauche, *Deutsche Dendrol.*, ed. 2, 151. 1883; C. K. Schneid., *Ill. Handb. Laubholz.* 2: 587 & 593, fig. 382 g—i & 385 b—g. 1911; Nakai, *Fl. Sylv. Kor.* 14: pl. 9. 1923; Mak., *Ill. Fl. Jap.* [894] (in color). 1924; Nakai in Nakai & Koidz., *Trees & Shrubs Indig. Jap.*, ed. 2, 1: 457, fig. [217]. 1927; Terasaki, *Nippon Shokubutsu Zufu* [Jap. Bot. Illustr. Album] 1593. 1933; Mak., *Gensyoku Yagai-shokubutu* [Nature-Col. Wild Pl.] 4: 281. 1933; Mak., *Ill. Fl. Nippon* fig. 562. 1940; Kitamura & Okamoto, *Col. Illustr. Trees & Shrubs Japan* 220. 1960; Li, *Morris Arb. Bull.* 14: 4, fig. 1—6. 1963.

Shrub or small tree, 2—5 m. tall; stems to 5 cm. in diameter; branches slender, spreading in horizontal fashion, subterete or very obsoletely tetragonal, occasionally slightly flattened at the nodes, glabrous, with gray bark; branchlets very slender, terete, grayish-brown or dark-purple, densely furfuraceous-pubescent or short-tomentose with sordid many-branched hairs; internodes usually abbreviated, 1—3.5 cm. long, occasionally to 6.5 cm. long; leaves decussate-opposite; petioles slender, 3—7 mm. long, densely pubescent or tomentose; leaf-blades membranous or chartaceous, herbaceous, often somewhat darker green above than beneath, varying from lanceolate to oblong or elliptic, 4.5—12 cm. long, 1.6—5.3 cm. wide, long-acuminate or caudate at the apex, rather sharply and irregularly serrate along the margins except on the acumination and at the base, rounded to a very obtuse or truncate (or rarely acute) base, densely short-pubescent or pilose above, densely farinaceous-pubescent with sordid and more or less stellate hairs beneath; midrib slender, prominent beneath; secondaries very slender, 5—7 per side, ascending, not very arcuate, usually obscure above, hardly at all or but very slightly prominent beneath; vein and veinlet reticulation fine and delicate, usually obscure; inflorescence axillary; cymes usually solitary, rarely paired, opposite, 1—2 cm. long and wide, rather few-flowered, often only once furcate, not branched, conspicuously bracteolate; peduncles very slender, 4—9 mm. long, pubescent or pilose; pedicels very slender, 1—3 mm. long, pubescent or pilose; bractlets linear, to 10 mm. long and 2 mm. wide; flower-buds dark-purple; flowers fragrant; calyx extraordinarily large, spreading campanulate-infundibular, 5—7.3 mm. long in all, 5 or more mm. wide, densely tomentose with irregularly branched hairs, its rim very deeply 4-fid, the divisions lanceolate, about 3.2 mm. long, sharply acute at the apex; corolla hypocrateriform, purple or orchid-purple to mallow-pink, its tube broadly cylindric, 3.9—4.7 mm. long, very much ampliate above, the limb 4-parted, the lobes ovate-lingulate, about 2.6 mm. long and 1.9 mm. wide, blunt at the apex, venose; stamens 4, inserted at the base of the corolla-tube, exserted; filaments filiform, 4—5.3 mm. long, glabrous; anthers large, oblong, about 2.1 mm. long and 1.1 mm. wide; pistil exserted and surpassing the stamens; style capillary, about 8.3 mm. long, glabrous, ampliate above into the stigma; stigma depressed-capitate, about 0.8 mm. wide; ovary subglobose, about 0.8 mm. long and wide, granulose-pulverulent, 4-celled; fruit purple or purplish-lilac to orchid-purple, purplish even when young, glossy.

The type of this species was collected by Philipp Franz von Siebold in Japan, not by "K. Th. E. von Siebold and J. G. Zuccarini" as erroneously stated in Fedde, Repert. Spec. Nov. 40: 116 (1936). Some recent collectors refer to the leaves as "opaque above" or "opaque on both sides", but what is meant by these statements is not clear to me. The corollas are described as "purple" on Charette 1738 and S. Suzuki SI.55, "mallow-pink" on Yamozaki 34, and "orchid-purple" on Charette 1564.

The species has been found growing in forests, summer-green forests, and deciduous broad-leaved forests, copses and thickets, damp woods, open borders and roadsides, and in humus in half-shade on mountainsides, at the base of and borders of ravines, and on open forested banks, at altitudes of 20 to 1000 meters, flowering from May to August and in November, fruiting in June, August, October, and November. Vernacular and common names recorded for it are "chobsalnam", "kaipinam", "ko isi wara", "kottsabinam", "namainoki", "weichhaarige Schönfrucht", "yabumurasaki", "yabumurasaki", "yabu-murasakishukibu", "yahumurasaki", and "yama-murasaki".

Suzuki tells us that the species is occasional in the shrub layer in sunny, moderately humid, windy, loam soil, with human disturbance, in deciduous oak forests. Wilson reports it "common" on Quelpart Island. Yanozaki says that it is "used as a garden tree" on Shikoku. Bean (1951) avers that it was introduced into cultivation [in England] in 1863. Li (1963) says that "It was first introduced by Richard Oldham in 1861-63 to Kew. It is still raised at Kew in a sheltered spot but is not as hardy nor as handsome as C. Bodinieri var. Giraldii. It is not certain whether the plant at present is in cultivation in America." The Herb. Bogor. 18099 collection, cited below, bears no indication on its label that it came from cultivated material, but this seems most probable.

A hybrid between C. mollis Sieb. & Zucc. and C. japonica Thunb. is known as x C. shirasawana Mak. This and its synonyms, C. mollis Shirasawa and C. mollis x japonica Schneid., are often placed in the synonymy of C. mollis (as, for example, by Bakhui-zen van den Brink in 1921 and by me in my earlier publications), but are discussed separately herein. The illustration given by Shirasawa (1895) as C. mollis represents the hybrid instead.

It is worth noting here that the Miquel (1865) reference given in the synonymy and bibliography above is dated "1866" by Bakhui-zen van den Brink (1921), that of Masamune (1955) is often cited as volume "6", and that of Siebold & Zuccarini (1846) as "(1): 526. 1844", which is definitely not correct, the "526" being the species number and not the page number, and 1844 is the date for part 1 of this work. The C. mollis of Koorders, referred to in the same synonymy above, is a synonym of C. caudata Maxim., that of Matsumura is C. oshimensis var. okinawensis (Nakai) Hatus., that of Shirasawa is x C. shirasawana Mak., while that of Reuquen and of Willdenow is C. acuminata H.B.K., and the C. farinosa of Roxburgh is C. tomentosa (L.) Murr.

The description of C. mollis by Siebold & Zuccarini (1846) is worth repeating here because it is not available in many libraries in the original: "ramis teretibus novellis canescentibus, foliis petiolatis e basi rotundata vel rarius attenuata ovato-oblongis vel oblongo longe acuminatis, basi et in acumine integerrimis ceterum inaequaliter serratis, superne pilis simplicibus molliter

villosis subtus pilis stellatis villosis, glanduloso-punctatis, cymis petiolum triplo superantibus cano-villosis 7—11-floris calycibus cylindricis profunde quadrifidis laciniis lanceolatis acutis corollis extus villosis, staminibus exsertis, antheris oblongis, obtusis rima dehiscentibus in connectivo glandulosis, stigmatе capitato incrassato. Rami juniores pilis stellatis furfuraceo-canescens. Folia petiolate petiolis circiter 8" longis, e basi rotundata raro attenuata ovata-oblonga, vel superiora nonnumquam oblongo-lanceolata longe acuminata, 1 1/2 — 4" longa, 6—8" lata, inaequaliter serrata, superne pilis simplicibus subtus stellatis villosa-canescens, utrinque glandulis pellucidis punctata. Cymae axillares vel supraaxillares strictae vix quartam folii partem aequantes, pilis stellatis dense villosae. Calyx cylindricus laciniis tubum fere superantibus lineari-lanceolatis acutis. Antherae pro ratione magnae basi bifidae, dorso, glandulae. Stylus cylindricus stamina parum superans, stigmatе incrassato truncato. Variat floribus pentameris pentandris."

Nakai (1923) describes the plant as "Frutex 3—5 metralis ramosus. Ramus juvenilis viridis stellulato-subvelutino-tomentosus. Petioli 3—10 mm. longi stellulato tomentosi. Lamina ovata v. obovata v. elliptica mucronato v. argute brevique serrata apice caudato-attenuata supra erecto-pilosa infra erecto-stellatopilosa utrinque resinose-punctata. Inflorescentia supra axillaris dense stellulata oligantha. Calyx alte 4-fidus, lobis lanceolatis stellato-tomentosis. Corolla dilute purpurea extus pubescens. Antherae ellipticae glandulosae. Fructus dilute purpureus diametro 5 mm."

Li (1963) describes it as a "Shrub, 2--5 m. tall, much-branched, the branchlets densely stellate-tomentose. Leaves obovate-elliptic to oblong-lanceolate, the apex acuminate, the base rounded, the margins serrulate, sparsely tomentose above, stellate-tomentose beneath, glandular on both surfaces; petioles 3—10 mm. long. Cymes axillary, short-peduncled or nearly sessile, densely flowered, the peduncles as long as the petiole, stellate-tomentose; calyx deeply 4-lobed, stellate-tomentose; corolla lilac-pink, glandular outside; stamens not exceeding the corolla lobes. Fruit globose, dull purple, about 5mm. across."

Krüssmann (1960) says "Ähnlich C. bodinieri, aber Zweige mehr halbstrauchig, ganz dicht weich behaart. Blätter elliptisch bis länglich-lanzettlich, lang zugespitzt, 5—10 cm lang, oberseits stumpfgrün, unterseits dick sternhaarig, gezähnt. Blüten rosa. Staubblätter so lang wie die Kronabschnitte. Früchte trüblila. — 1863. N.T. 1: 57; N.K. 14: t. 9. Kaum ausreichend winterhart, auffallend durch die starke Behaarung."

It should be noted that the name, Callicarpa mollis, is not precluded for this taxon under the present International Rules of Botanic Nomenclature because the C. mollis of Willdenow, effectively published 4 years earlier, was published in synonymy only and is therefore not regarded as having been published validly.

Masamune (1955) includes in the synonymy of C. mollis the name "Callicarpa japonica Thunb." of Tasiro (1894), but with a question.

He also regards the "C. mollis" of Matsumura (1899 & 1912, insofar as Ryukyu specimens are concerned), Kuroiwa (1900, in part), Wilson (1920), and Sakaguchi (1924) as referring to C. oshimensis var. okinawensis.

Sugawara (1969) tells us that the true C. mollis grows in the shrub layer in plantations of Cryptomeria japonica. Ohwi (1965) provides us with a key to the Japanese species of the genus, for which see under C. dichotoma in the present series of notes.

As to the natural geographic distribution of C. mollis, Nakai (1923) says "Hondo, Shikoku et Kiusiu", Li (1963) says "This species is native to Japan and Korea", Masamune (1955) says "Tanggesima; Kurosima; Yakusima; Iriomote; Honsyu; Sikoku; Kyusyu; Taiwan; Corea", and Ohwi (1965) says "Honshu (Rikuchu Prov. and southw.), Shikoku, Kyushu. — Korea". Hara (1958) unites var. microphylla Sieb. & Zucc. with the typical form of the species and gives the combined distribution as "Japan, Korea, Ryukyu, and Formosa".

Actually, I have found no specimens among those examined by me that were really collected in the Ryukyu Islands. The so-called records from these islands as given by Matsumura and Masamune are probably based on misidentifications of material that will prove to have been C. oshimensis Hayata and/or C. oshimensis var. iriomotensis (Masam.) Hatus. and C. oshimensis var. okinawensis (Nakai) Hatus.

Miquel (1870) cites Bürger 5 [specimens?], Siebold 4 [specimens?], Textor 3 [specimens?], Maximowicz 1 [specimen?], Oldham 1 [specimen?], Mohnike 1 [specimen?], and C. Wright 1 [specimen?].

Material of C. mollis has been misidentified and distributed in herbaria under the names C. cuspidata Roxb., C. japonica Thunb., C. kochiana Mak., and Elaeagnus glabra Thunb. On the other hand, the Oldham 620, distributed as C. mollis, is actually C. japonica Thunb., Albrecht s.n. [1861] and Hort. Tjibodasensis P. are C. japonica var. rhombifolia H. J. Lam, and J. Matsumura s.n. is C. oshimensis var. okinawensis (Nakai) Hatus.

The U. S. Dept. Agric. Pl. Inventory 235499, 263642, & 304937, cited by Griffith & Hyland (1966) and by Hyland (1967, 1968), were all grown in Maryland from seed collected in Japan, the first-mentioned being the seed of J. L. Creech 509.

In all, 115 herbarium specimens and 3 mounted photographs of C. mollis have been examined by me.

Citations: KOREA: Witford s.n. (T). KOREAN COASTAL ISLANDS: Quelpart: Faurie 1892 (Du--14019, V--127); Kitamura s.n. [19 Jul. 1930] (Mi); E. H. Wilson 9525 (W--1054201). JAPAN: Hiradoshima: Weiss 1138 (Bz--18101). Honshu: Charette 1555 (Ca--77252, Dt, S, W--2247697), 1564 (Ca--77440, W--2247702), 1738 (Ca--77469, Dt, S, W--2247797); Collector undetermined 362 (W--9981); Furuse s.n. [11 July 1955] (S), s.n. [18 July 1955] (S). To be continued.

An overview of the Hookeriales

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The Hookeriales have been considered to be one of the more homogeneous orders of mosses. Suborders Ephemeropsidineae (= Nematacineae) and Hookeriineae have been distinguished for many years on the basis of the gametophyte being reduced to a protonema bearing sexual buds in the first and a normal leafy gametophyte in the second. The common bond within the order is based almost entirely on the usually small, often roughened, sporophyte with a double peristome, the conical to mitriform, often fringed, calyptra, a comparatively lax areolation and an absence of alar cells. The "hookeriaceous" peristome is usually characterized by a lamellate exostome somewhat taller than the endostome with its low to medium basal membrane and simple processes which are only rarely separated by a single cilium. As Crosby (1969) correctly observed of the Hookeriaceae as defined by Brotherus (1925), "one finds no character or group of characters that unite the group." However, one can find an aggregate of features among groups of genera which can be aligned to show a common heritage even though not all are present in any single genus or group of allied genera. Welch (1966, 1969) has considered the Hookeriaceae in the broad sense.

The acknowledged heterogeneity of the Hookeriaceae as defined by Brotherus can be better understood if we recognize that his description and arrangement is essentially an abridgement of Fleischer's system presented in 1908. The success of Fleischer's system for the mosses is due to his acceptance of the concepts of evolution, as known at that time, and their application to develop an arrangement on something other than an artificial basis. Bessey's "dicta" presented in 1915 indicating the importance of reduction as one aspect of evolutionary advancement had not yet appeared in a refined form, so we find that, for the most part, the taxa have been placed in a simple to complex order. Further,

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great stress was placed on the structure of the peristome and the morphology of the gametophyte was considered to be of somewhat lesser importance. If both sporophytic and gametophytic structures are taken into account, and if we allow reduction as an indication of advancement, the Hookeriaceae can be rearranged into several comparatively homogeneous groups with a common heritage.

Because the reorganization proposed differs considerably in some ways from the Fleischer-Brotherus system, my principles of classification are listed below. In utilizing the principles the following general premises, derived in the main from Hutchinson (1959), must be taken into account: 1) evolution is both upwards and downwards, the latter involving degradation and degeneration; 2) evolution does not involve all organs, or both generations, at the same time and both elaboration and degeneration may be occurring at the same time; and 3) evolution has generally been consistent with a particular tendency potentially being carried to the extreme of elaboration or reduction although the extremes may not be present in extant groups.

Some Principles for Moss Systematics

N.B. The principles are arranged from general to specific features, but no relative importance is to be implied from the order.

1. Within any group, the larger mosses are generally more primitive than smaller ones.
2. Closely attached forms with all stems leafy are more primitive than stoloniferous forms.
3. Perennial mosses are more primitive than the annual or ephemeral species including those with a persistent protonema.
4. Both completely aquatic and xerophytic forms are derived from an aerial, but almost constantly moist, ancestor.
5. A central strand in the stem is a primitive feature.

6. Stems with a several-layered cortex comprised of thick-walled or stereid cells are more primitive than stems with a unistratose or undifferentiated cortex.
7. Leaf gaps are a primitive feature.
8. Radial leaf arrangement is more primitive than distichous arrangement with the complanate condition probably intermediate.
9. A strong costa is more primitive than a weak one with the ecostate condition most derived.
10. An excurrent costa is an advanced characteristic sometimes associated with blade reduction.
11. Well developed alar cells may be an advanced condition.
12. Smooth leaf cells may be primitive with papillate cells the derived condition.
13. Extremely thin-walled or thick-walled cells are derived.
14. Specialized vegetative reproduction by brood-bodies is more advanced than vegetative propagation by simple fragmentation and regeneration.
15. Monoicous sexuality is more primitive than the dioicous condition.
16. Numerous gametangia and paraphyses are more primitive than few archegonia or antheridia per inflorescence.
17. Sexual dimorphism, expressed in the extreme by the formation of dwarf males and the heterosporous tendency, as in some species of Macromitrium and Homalothecium, is advanced.
18. An elongate seta bearing an exposed capsule is more primitive than a short seta with an immersed capsule.
19. A capsule wall with stomata, especially when associated with air chambers, represents a more primitive condition than the capsule lacking stomata.

20. Cleistocarpus is probably a derived condition in the Bryidae.
21. A reduced endostome lacking processes on the basal membrane is advanced over one with processes and a high basal membrane; the presence of cilia may also be advanced.
22. A peristome which is very much reduced or absent is derived from a normal peristome.
23. Retention of the operculum or a portion of it on the columella is an advanced condition.

Several taxonomically useful morphological variants are not included above because I have been unable to divine the relative conditions of such things as leaf borders, lamellae, cell shapes, paraphyllia, plane vs. keeled structures, single vs. double peristomes, acrocarpy vs. pleurocarpy (there is good evidence both ways), calyptra type, and a multitude of structural features of the peristome such as median lines, surface, striations, and accessory ornamentation. Surely the list may be substantially revised, but if it serves to stimulate development of a better classification and critical morphological research, the purpose will have been well served.

As defined until Crosby's (1969) Pilotrichum revision appeared, the Hookeriineae was comprised of the Pilotrichaceae, Hookeriaceae, and the Hypopterygiaceae. Because he found little difference between Pilotrichum and Helicoblepharum or among Thamniopsis, Pilotrichidium and Diploneuron, Crosby merged the Pilotrichaceae with the Hookeriaceae. He apparently was correct in his evaluation of the generic relationships of Pilotrichum with members of the Hookeriaceae as defined at that time. If we consider the position of Pilotrichum and its allied species within the order, it is among the more primitive types and quite distinct from all but a few genera customarily included in the Hookeriaceae-Hypnelloideae. In such a case it seems best to set this group apart as the family Pilotrichaceae and to arrange the genera within it in as natural a sequence as possible.

From some Pilotrichaceous type, one may derive the Hookeriaceae-Hookeriopsidoideae with a long double costa, elongate seta, complanate foliage, and a pinnate habit. This, in turn, mainly by reduction of the costa and seta along with

the development of comparatively lax areolation, leads to the Hookeriaceae-Hookerioideae.

The Hookerioideae, perhaps through a common ancestor to Eriopus, link to the Distichophyllaceae characterized by the asymmetric, bordered, once costate, parenchymatous more or less isodiametrically areolate leaves and the cross-striate peristome. Müller suggested that this group be recognized as the family Mniadelphaceae nearly 100 years ago but no description was included so his name cannot stand.

The Daltoniaceae resemble the Distichophyllaceae in the bordered leaves with a single costa and isodiametric cells but differ in their smaller size, radial symmetry, uniform leaves, upright habit and their selection of ephemeral habitats as twigs, leaves, and even the backs of large weevils in the cloud forests of New Guinea. The peristome differs from others in the order in that both ranks are strongly papillose and well-developed with the exostome lacking striae.

It is quite likely that Daltonia and Ephemeropsis have a common origin but the separation, as evidenced by the striate rather than papillose peristome, is great and doubtless of long standing. Fossils of Ephemeropsis have been found in middle Eocene deposits from Germany suggesting that it was once more widely distributed than just to Malesia and New Zealand as at present. Continued recognition of the family in a separate suborder seems quite proper.

Although Fleischer and Brotherus placed the Symphyodontaceae and Leucomiaceae in the Hookeriales, Dixon (1932) assigned them to the Hypnales (assuming that "Symphsodontaceae" is a mis-print or lapsus for Symphyodontaceae). The morphology of the gametophyte is suggestive of Vesicularia and allied Hypnaceous genera but the evidence is not clear. Unfortunately, Dixon did not give any explanation for the shift which has not been taken up by Bartram (1939, 1949), Crum and Bartram (1958), or Crum and Steere (1957), for example. The leaves of Symphyodon have a few alar cells but the erect, spiny, purple, capsule with simple papillose exostome teeth and a reduced endostome is quite unlike that characteristic of the Hypnaceae. Leucomium has a Hookeria-like peristome and shares the very large thin-walled cells characteristic of Hookeria as well. Until some evidence can be offered to substantiate Dixon's opinion, I am satisfied that these families can be reasonably considered among the Hookeriales.

A specialized derivative, probably from the Distichophyllaceae, is the Hypopterygiineae comprised of the Hypopterygiaceae and the Cyathophoraceae. The complanate habit is carried to the extreme with the development of markedly different obliquely inserted, wide-spreading, lateral leaves and reduced, transverse, erect, amphigastrial leaves. A stipe with widely spaced, often scale-like, leaves or a prostrate stoloniferous stem is developed. The very short to absent costa, regular alignment of the amphigastria, and very short seta serve to set off the Cyathophoraceae from the Hypopterygiaceae.

In the following revision I have arranged the taxa so far as possible according to the principles listed above. As the positions of the genera are subject to various interpretations depending upon the importance placed on one feature or another, I have not attempted to further justify the sequence of genera as presented. Some groups remain heterogenous and may be defined ultimately in somewhat different ways.

ORDER HOOKERIALES

Suborder Hookeriineae

Pilotrichaceae

- | | |
|-----------------------------|-----------------------------|
| 1. <u>Hemiragis</u> | 9. <u>Hypnella</u> |
| 2. <u>Thamniopsis</u> | 10. <u>Neohypnella</u> |
| 3. <u>Stenodictyon</u> | 11. <u>Acrohypnella</u> |
| 4. <u>Pilotrichidium</u> | 12. <u>Chaetomitriopsis</u> |
| 5. <u>Diploneuron</u> | 13. <u>Chaetomitrium</u> |
| 6. <u>Callicostellopsis</u> | 14. <u>Orontobryum</u> |
| 7. <u>Helicoblepharum</u> | 15. <u>Dimorphocladon</u> |
| 8. <u>Pilotrichum</u> | |

Hookeriaceae

Hookeriopsidoideae, subfam. nov. Folium cum costa duplici ad vel supra medium folium soluta; cellulae laeves vel unipapillatae. Exostomium cum dentibus hyalinis et papillosis aut rubris vel brunneolis et cruciatistriatis; endostomium plerumque flavidum, cum membrana basali processus subulatos papillosos carinatos ferens. Typus: Hookeriopsis (Besch.) Jaeg.

Leaves with a double costa usually extending to mid-leaf or beyond, narrowly bordered to unbordered; cells smooth to unipapillate over the lumen. Peristome double; exostome pale to hyaline and papillose or red to brown and cross-striate; endostome pale yellow to brownish, basal membrane bearing keeled papillose processes with no, or rarely rudimentary, intercalated cilia.

- | | |
|--------------------------|-------------------------|
| 1. <u>Amblytropis</u> | 5. <u>Actinodontium</u> |
| 2. <u>Cyclodictyon</u> | 6. <u>Lepidopilum</u> |
| 3. <u>Archboldiella</u> | 7. <u>Hookeriopsis</u> |
| 4. <u>Lepidopilidium</u> | 8. <u>Callicostella</u> |

Hookerioideae

- | | |
|--|-------------------------|
| 1. <u>Hookeria</u> | 4. <u>Crossomitrium</u> |
| 2. <u>Tetrastichium</u> | 5. <u>Eriopus</u> |
| 3. <u>Schimperobryum</u> (= <u>Lamprophyllum</u>) | |

Distichophyllaceae, fam. nov.

Caulis diversifolius; foliis plerumque asymmetricis et limbatis; costa singulari, infra apicem soluta sed interdum percurrent; cellulae hexagonae vel rhombiformes cum parietibus tenuibus et laevibus, aut rotundae cum parietibus incrassatis et interdum papillosis. Typus: Distichophyllum Dozy et Molkenb.

Leaves of varying size and shape on the same stem, usually asymmetrical and generally bordered; costa single usually ending below the apex but sometimes percurrent; cells generally thin-walled and hexagonal above, but sometimes rhombid, or thick-walled and rounded, smooth or (in Adelothecium) papillate over the lumen. Peristome double with the exostome well developed and the endostome with a high basal membrane and long processes or a low membrane and reduced teeth or absent.

- | | |
|------------------------------|---------------------------|
| 1. <u>Pterygophyllum</u> | 4. <u>Leskeodon</u> |
| 2. <u>Distichophyllum</u> | 5. <u>Leskeodontopsis</u> |
| 3. <u>Distichophyllidium</u> | 6. <u>? Adelothecium</u> |

The position of Adelothecium in this family is questionable although the peristome is very similar to the others and the leaves have a single costa. It differs in the leaves being unbordered with incrassate, strongly truncate-papillate cells. If another alliance cannot be found for the genus it should probably be placed in a separate subfamily.

Daltoniaceae, fam. nov.

Plantae gregariae vel caespitosae, plerumque parvae, epiphyticae, leviter nitidae, dilute virides vel aureae sunt. Folia aequabiles, erectiuscula vel erecto-patentia; margine limbato et integro; costa singula et infra apice soluta; cellulis rhombis vel rotundis, laevibus. Peristomium duplex, exterius et interius pariter longus. Typus: Daltonia Hook. & Tayl.

Gregarious to turf-forming, usually small and little branched, epiphytic, faintly shiny plants. Leaves uniform, symmetrical, and erect-spreading; margin bordered and mostly entire; costa single, ending below or in the apex; cells rhomboid to rounded and smooth. Peristome double with the exostome the same length as the endostome and papillose (except Bellia); endostome usually with a low basal membrane bearing keeled, subulate, papillose processes.

1. Bellia

2. Daltonia

Symphyodontaceae

1. Symphyodon

Leucomiaceae

1. Vesiculariopsis

5. Pulvinella

2. Philophyllum

6. Stenodesmus

3. Sauloma

7. Rhynchostegiopsis

4. Leucomium

Suborder Ephemeropsidineae (Nematacineae)

Ephemeropsidaceae (Nemataceae)

1. Ephemeropsis (including Archephemeropsis)

Suborder Hypopterygiineae, subord. nov.

Rami cum foliis in stipite ex caule rhizomate errigens. Folia dimorpha, amphigastriis comparate parvis et transverse affixis autem foliis lateralibus oblique insertis. Typus: Hypopterygiaceae.

Leafy branches stipitate from a rhizome-like stem and usually dendroid or pinnately branched; central strand strong. Leaves of two types; lateral leaves obliquely to nearly longitudinally inserted, usually plane and oblong; ventral leaves transverse or nearly so, erect, often lanceolate to subulate, and smaller than lateral leaves, being true amphigastria. Peristome double or the exostome lacking; endostome with a plicate basal membrane and keeled processes.

Hypopterygiaceae

- | | |
|-------------------------|------------------------|
| 1. <u>Lopidium</u> | 3. <u>Catharomnium</u> |
| 2. <u>Hypopterygium</u> | |

Cyathophoraceae, fam. nov.

Plantae gregariae, arboricolae aut in saxo humido, cum caulibus foliosis simplicibus et stipitibus brevibus. Folia dimorpha, amphigastriis imbricatis et in specie singulari, foliis lateralibus distichis; cellulis tenuiparietibus, hexagonis. Fructus in axillis amphigastriorum; seta brevi; capsula globosa vel cylindrica; peristomium duplex, exterius cum dentibus 16 lanceolatis et interius cum dentibus 16 lanceolatis in membrana basali alta; operculum conicum rostratum. Calyptra conica et parva.

Usually large, gregarious plants rising from a brown, densely tomentose rhizome attached to moist, shaded, tree trunks, logs, or damp rocks, with the simple leafy branches usually horizontal and stipitate below. Leaves dimorphic, the imbricate amphigastria in a single row, lateral leaves distant, obliquely inserted on either side of the stem and somewhat asymmetric; cells thin-walled, isodiametric to elongate-hexagonal, smooth, and punctulate. Dioicous with sexual buds in axils of the amphigastria. Seta short, smooth, with an erect, globose to cylindrical, thick-necked capsule; annulus broad; peristome double; exostome with 16 lanceolate teeth; endostome with a high basal membrane bearing lanceolate processes; operculum conic and beaked. Calyptra conic and small.

- | | |
|------------------------|--------------------------|
| 1. <u>Cyathophorum</u> | 2. <u>Cyathophorella</u> |
|------------------------|--------------------------|

Literature Cited

- Bartram, E.B. 1939. Mosses of the Philippines. *Philippine J. Sci.* 68: 1-437.
- . 1949. Mosses of Guatemala. *Fieldiana Bot.* 25: 1-442.
- Bessey, C.E. 1915. The phylogenetic taxonomy of flowering plants. *Ann. Mo. Bot. Gard.* 2: 109-164.
- Brotherus, V.F. 1925. Musci (Laubmoose) 2. Hälfte. In Engler, A. & K. Prantl. *Die Natürlichen Pflanzenfamilien*. Aufl. 2. 11: 1-542.
- Crosby, M.R. 1969. A revision of the tropical American moss genus *Pilotrichum*. *Bryologist* 72: 275-343.
- Crum, H.A. & E.B. Bartram. 1958. A survey of the moss flora of Jamaica. *Bull. Inst. Jamaica Sci.* 8: 1-90.
- & W.C. Steere. 1957. The mosses of Porto Rico and the Virgin Islands. *Sci. Surv. Porto Rico* 7: 395-599.
- Dixon, H.N. 1932. Classification of mosses. In Verdoorn, F. *Manual of bryology*. pp. 397-412. Nijhoff. The Hague.
- Fleischer, M. 1904-1923. *Die Musci der Flora von Buitenzorg*. *Flore de Buitenzorg* 5, 1: i-xxxi & 1-379 (1904); 2: i-xvii & 381-643 (1904); 3: i-xxiv & 645-1103 (1908); 4: i-xxxi & 1105-1729 (1923).
- Hutchinson, J. 1959. *The families of flowering plants*. ed. 2. 2 vol. Oxford University Press.
- Welch, Winona H. 1966. The Hookeriaceae of Mexico. *Bryologist* 69: 1-68.
- . 1969. The Hookeriaceae of Cuba. *Bryologist* 72: 93-136.

FIVE MORE NOVELTIES IN THE VERBENACEAE

Harold N. Moldenke

JUNELLIA TONINII (Kuntze) Moldenke, comb. nov.

Verbena toninii Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898.

LIPPIA EUPATORIUM var. *ANGUSTIFOLIA* Moldenke, var. nov.

Haec varietas a forma typica speciei foliis angustioribus et pedunculis brevioribus differt.

This variety differs from the typical form of the species in its leaf-blades being narrower, about 3 cm. long and 5—8 mm. wide, and the peduncles shorter, 2—4.5 cm. long.

The type of the variety was collected by João Murça Pires, Nilo Tomaz da Silva, and R. Souza (no. 9652) in the cerrado between Brasília and Niquelândia, Distrito Federal, Brazil, on May 16, 1963, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a shrub, with the bracts "esverdeadas", and the corollas cream-color.

PREMNA GUILLAUMINII Moldenke, sp. nov.

Frutex; ramis ramulisque glaberrimis gracillimis; foliis parvissimis petiolatis, laminis 0.5—1.5 cm. longis et latis rotundis vel rotundato-ellipticis utrinque glaberrimis, ad apicem obtusis vel subacutis, ad basin plerumque rotundatis; inflorescentiis parvissimis paucifloris terminalibus.

Small shrub, to 1 m. tall; branches and branchlets slender, smooth; leaves decussate-opposite, numerous, very small, petiolate; petioles extremely slender; leaf-blades chartaceous, uniformly green on both surfaces, round or rounded-elliptic, 0.5—1.5 cm. long and wide, glabrous on both surfaces, shiny, rounded or obtuse to subacute at the apex, entire along the margins, mostly rounded at the base, inconspicuously venose; inflorescence terminal, very small, few-flowered, cymose, about 1.5 cm. long and 1 cm. wide, its branches minutely puberulent; calyx cupuliform, about 2 mm. long and wide, light-colored, pulverulent on the outside, its rim plainly 5-toothed.

The type of this distinctive species was collected by André Guillaumin and M. G. Baumann-Bodenheim (no. 9615) on serpentine at the foot of Mount Kaféaté, New Caledonia, on December 22, 1950, and is deposited in the Britton Herbarium at the New York Botanical Garden.

PREMNA GUILLAUMINII f. *SERRATA* Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum grosse dentatis recedit.

This form differs from the typical form of the species in having its leaf-blades coarsely dentate.

The type of the form was collected by M. G. Baumann-Bodenheim

(no. 6476) in calcareous soil at the foot of Ouen Toro near Nouméa, New Caledonia, on October 3, 1950, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector describes the plant as a bush, 30 cm. tall, and avers that it is merely a juvenile form of what he calls *P. integrifolia* L. [now known as *P. obtusifolia* R. Br.]. This seems highly unlikely because the latter has been collected in literally hundreds of widely scattered localities throughout the Pacific area, often with large series of specimens representing each collection, with never such a juvenile form found!

STACHYTARPHETA IRWINII Moldenke, sp. nov.

Frutex; ramis ramulisque dense adpresso-strigillosis; foliis oppositis vel alternato-approximatis sessilibus subcoriaceis firmis utrinque pallide flavido-viridibus ellipticis 3—5 cm. longis 1.5—2.5 cm. latis acutis vel rotundatis, ad basin cuneatis, supra subglabratis subtus dense puberulentibus; inflorescentiis spicatis densissimis 3.5—6 cm. longis.

Small shrub, about 1 m. tall; apparently with numerous erect stems or branches; branches and branchlets slender, brownish, densely appressed-strigillose with antrorse hairs; leaves opposite or subopposite to approximate-alternate, numerous, sessile, subcoriaceous, firm, light yellow-green on both surfaces, elliptic or slightly subobovate, 3—5 cm. long, 1.5—2.5 cm. wide, rounded to subacute or acute at the apex, long-cuneate at the base, serrate-dentate from below the widest part to the apex, subglabrate above, densely puberulent beneath, more or less conspicuously reticulate-veined on both surfaces; inflorescence spicate, very dense, 3.5—6 cm. long during anthesis; calyx tubular, about 1 cm. long, slightly widened above, conspicuously 5-ribbed, densely puberulent on the outside, its rim shortly 5-toothed with deltoid-triangular teeth about 0.5 mm. long; corolla hypocrateriform, metallic-blue, its tube slightly surpassing the calyx, the limb about 7 mm. wide, densely white-strigillose in the throat.

The type of this species was collected by H. S. Irwin, S. F. da Fonseca, R. Souza, R. Reis dos Santos, and J. Ramos (no. 28208) on outcrops in an area of campo, cerrado on outcrops, and wooded valleys, at an elevation of 1200 meters, about 3 km. north of São João Chapada, in the Serra do Espinhaço, Minas Gerais, Brazil, on March 24, 1970, and is deposited in my personal herbarium at Plainfield, New Jersey. It is named in honor of the senior collector, who has done such noteworthy work on the flora of Guyana, Surinam, and Brazil and to whose labors we owe so much of our present knowledge of the flora of these areas.

BOOK REVIEWS

Alma L. Moldenke

"MORPHOGENESIS IN PLANTS -- A CONTEMPORARY STUDY", 2nd edition, by C. W. Wardlaw, 451 pp., illus., Methuen & Company, Ltd., London E.C.4, or Barnes & Noble, Inc., New York, N. Y. 10003 as U.S.A. distributors. 1968. \$14.50.

This complete revision and fuller development of the first edition of 1952 is a valuable contribution from the author who has spent his whole professional life developing this field. It is a well written, well developed and well illustrated treatment for each part and for the plant as a whole. "That plants exemplify the phenomenon of continued embryology cannot be denied: it is there as an evident fact of observation (the great ascending trunk of a giant Californian redwood may be the result of 3,000 years of apical growth or continued embryology!)"

The book is very neat, yet Allium is misspelled on p. 308 and induction on p. 313.

I like the author's outlook: "The fruits of molecular biology, which are already remarkable and are growing with increasing acceleration, are of vital importance. But they can never be self-sufficient, for the growing plant has organizational characteristics not only at the molecular level, but also at the several higher levels -- cell, tissue, organ -- which we see in the harmoniously developed whole organism, as well as in its several specialized organs. For the same reason, there can never be a progressive botanical science based on a single branch of inquiry, be it morphology, physiology, genetics, ecology, etc. Botany -- the science of plants -- has a heritage from all its branches....Let us constantly seek new facts, liberating ideas, validating experiments and inferences of wide generality."

"CONSERVATION OF NATURAL RESOURCES", 4th edition, edited by Guy-Harold Smith, xiii & 685 pp., illus., John Wiley & Sons, Inc., New York, N. Y. 10016, London, Toronto, & Sydney. 1971. \$11.95.

Each edition of this standard valuable work has been somewhat updated and freshly and richly illustrated. The twenty-two authors of this edition are well recognized in their respective fields of specialization. The book is well organized and duplications, gaps, contradictions, and divergent styles of writing are all avoided. This is a real credit to the experienced editor, who also authors five articles.

The book is divided into eight parts carefully covering these topics: conservation in the United States with the concomitant economics, water use and abuse, mineral resources and fuels, grass-

land and forest resources, wild life including fish, recreational resources, urban and national planning, and the conservation of man himself. The illustrations on flooding and the United States soil maps and classifications are highlights of this edition. The format is attractive to and easy on the eyes. Just one slight printing error was noticed — the misspelling of volcanic on p. 72.

This text will continue to have considerable use throughout our campuses that are at all rurally aware or oriented. It may be bypassed by urban-limited schools to the great loss of the students whose lives have been limited by asphalt, concrete, brick and canned food.

"PHOTOBIOLOGY" by Jerome J. Wolken, xiii & 113 pp., illus., Van Nostrand-Reinhold, Inc., New York, N. Y. 10022. 1969.
\$2.25 paper-back.

This twelfth in the "Selected Topics in Modern Biology" series clearly discusses the world's sunlight as part of the electromagnetic spectrum, light-sensitive pigments, photosynthesis, chloroplasts, photomotion, vision with simple and compound eyes, and vitamin A. It is written at the level of the beginning college student needing additional clarification, of the high school biology student seeking enrichment and of the general reader. It is well illustrated and indexed.

"FLORIDA LANDSCAPE PLANTS — Native and Exotic", by John V. Watkins, 368 pp., illus., University of Florida Press, Gainesville, Florida 32601. 1969. -\$7.50.

The author, who has been teaching landscape gardening at the University of Florida for years, planned this excellent and attractive book for the home owner, the student and professional nurseryman, the tourist, etc. In it he updates material for over 350 of Florida's best landscape plants from "Your Guide to Florida Landscape Plants" (1961) and from the companion volume on tropical exotics (1963). Each plant is illustrated with simple line drawings. The descriptive text for each is constructed after this outline: common and scientific names, family, type, identifying features, growth habit, foliage, flowers, fruits, landscape uses, habitat, light and soil requirements, salt tolerance, sources, culture, propagation and pests. There is a glossary and index.

NEW NORTH AMERICAN UNIFOLIOLATE CROTALARIA TAXA

(LEGUMINOSAE)

Donald R. Windler*

Over the last several years I have been engaged in studies of the North American species of Crotalaria related to Crotalaria sagittalis L. During these studies it became evident that some of the plants examined represented new taxa. In the text which follows, three species and two varieties are described for the first time. A third variety is transferred to a different species from the one under which it was originally recognized. Dr. Robert H. Mohlenbrock, Southern Illinois University, has translated the descriptions into Latin and Mrs. Miriam Wysong Meyer has prepared illustrations for each of the new species.

CROTALARIA BREVIPEDUNCULATA Windler, sp. nov.

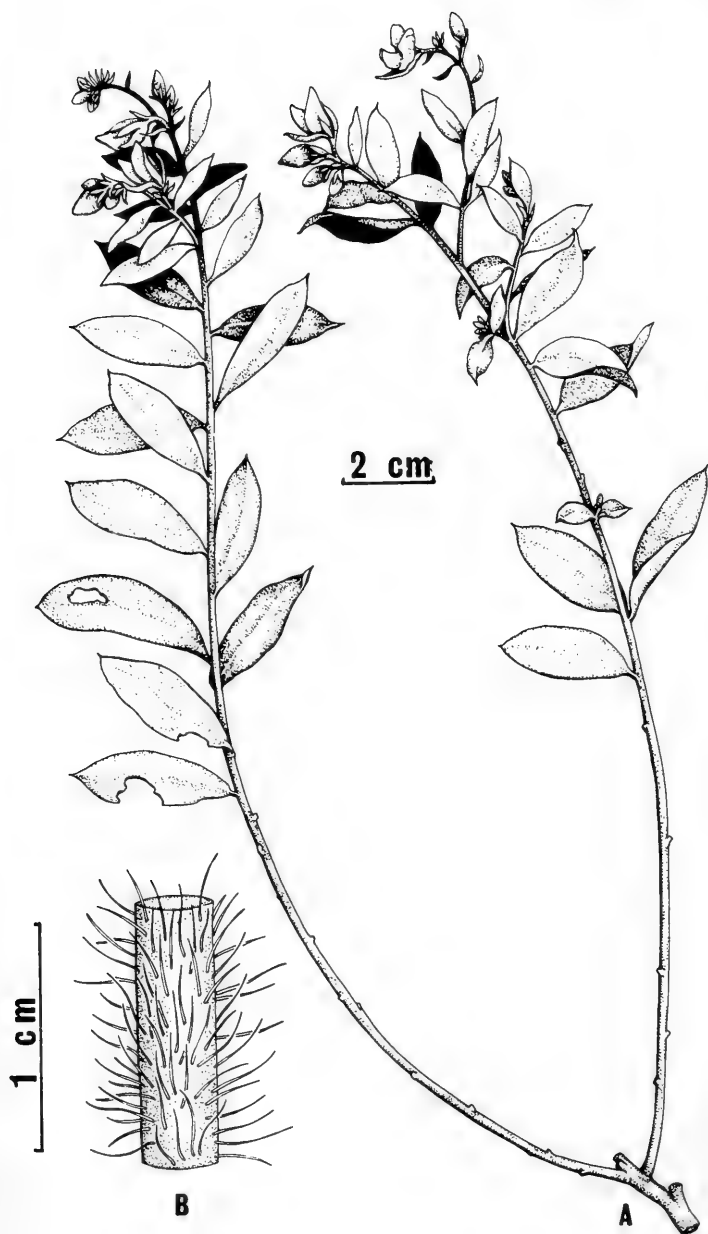
Frutex vel herba suffrutescens. Radix ignota. Caules ultra 3 dm longi, 3.5 mm crassi, internodium longissimum 1.2 cm longum, trichomis densis brevibus patentibus 0.6-0.7 mm longis. Stipulae nullae. Folia elliptica vel elliptico-oblonga, 2.1-4.4 cm longa, 5-13.5 mm lata, ad basim cuneata vel acuta late, ad apicem acuminata, trichomis laxe adpressis 0.5-0.9 mm longis; petioli 1.6-2.1 mm longi.

Inflorescentia terminal et etiam foliis opposita, pedunculo 1.2-6.1 cm longo. Bracteae sessiles lineares vel anguste lanceolatae, 4-4.4 mm longae, 0.3-0.6 mm latae; pedicellus 3.8-4.2 mm longus; calyx 10.5-11 mm longus, tubo 2.5 mm longo, trichomis patentibus 0.5-0.7 mm longis; bracteolae lineares, 3.5 mm longae, 0.2-0.3 mm latae. Corolla lutea, vexillum 10.5-11 mm longa, aequans lobis superis calycis; antherae elongatae 1.6-2 mm longae, antherae breves 0.3-0.4 mm longae; stylus 6.4 mm longus. Fructus et semina ignoti. Chromosome number: not known. Flowering date: December 20. Habitat: shady canyon slope with oaks and palms, elevation 3,500 feet. Range: Mexico; Durango, Sinaloa. Figure 1.

Holotype: Gentry 5311 (GH)

Type locality: Sierra Tres Picos, Durango, infrequent, scattered.

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Crotalaria brevipedunculata is characterized by its lack of stipules, short terminal inflorescences and small flowers. It most nearly resembles C. nitens, but differs from it in smaller flower size and shorter peduncles.

In addition to the holotype only one other collection of this species has been observed:

MEXICO.--Sinaloa: Puerto a Tamiapa, Gentry 5815 (MICH, NY).

CROTALARIA MEXICANA Windler, sp. nov.

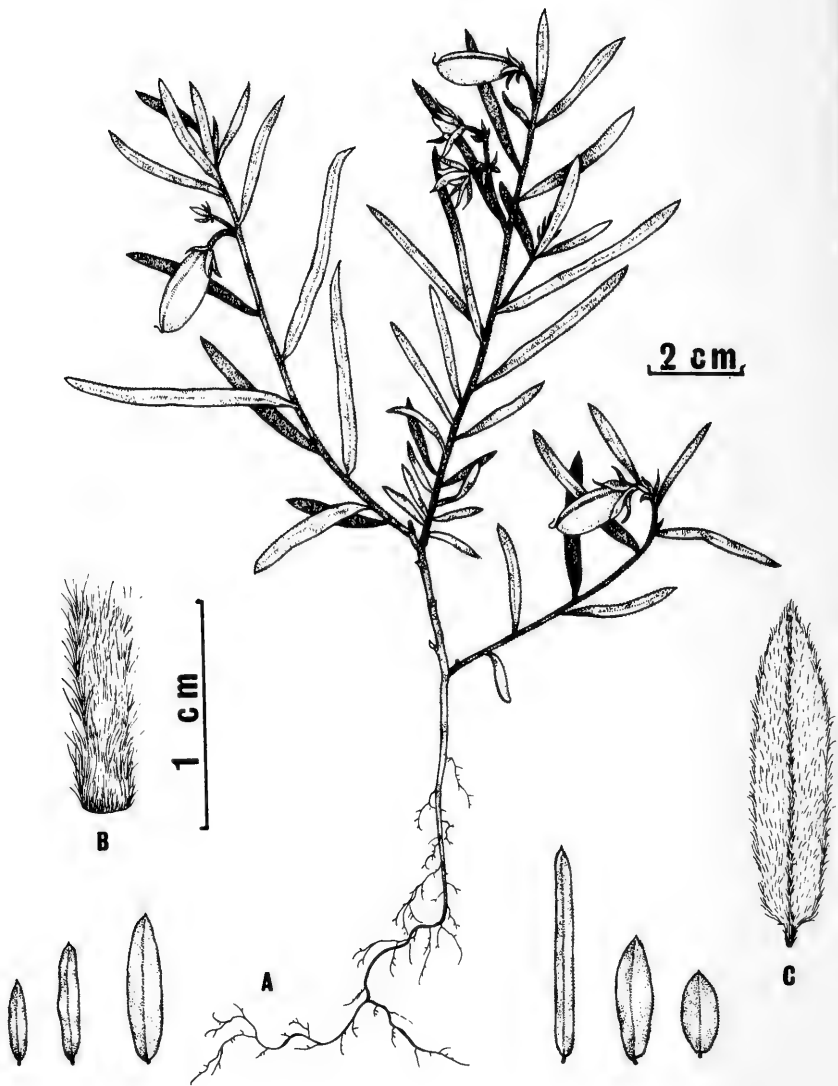
Crotalaria sagittalis var. fruticosa (Miller) Fawcett and Rendle, 1920, Vol. 4, p. 10, pro parte, sensu Senn, non sensu typus.

Herba annua erecta radice palari tenui usque 0,3 cm crassa. Caulis solitarius, 1.2-2.3 dm longus, 1.6-2.4 mm crassus, internodium longissimum 1.0-1.5 cm longum, trichomis densis adpressis 1.2-2.5 mm longis. Stipulae nullae. Folia anguste elliptica, lineari-lanceolata, vel linearia, 2.2-4.6 cm longa, 4-8 mm lata, ad basim rotundata vel cuneata, ad apicem rotundata, acuta vel acuminata, trichomis laxe adpressis 1.1-2.1 mm longis; petioli 0.5-0.6 mm longi.

Inflorescentia foliis opposita, pedunculo 0.8-2 cm longo. Bracteae lanceolatae, 3.3-3.6 mm longae, 0.7-0.8 mm latae; pedicellus 2.5-4 mm longus; calyx 10.5-11.5 mm longus, tubo 2-2.5 mm longo, trichomis 0.8-2 mm longis, laxe adpressis et patentibus; bracteola lineari-lanceolata, 4-4.5 mm longa 0.5-0.6 mm lata. Corolla lutea, vexillum 10-10.5 mm longum aequans vel 0.5 mm brevior lobis superis calycis; antherae elongatae 1.5-1.7 mm longae, antherae breves 0.5-0.6 mm longae; stylus 4.8-5.3 mm longus. Fructus 2.1-2.5 cm longi, 0.8-1 cm lati; numerus seminum per legumen ignotus; semina brunnea, 1.8-2 mm longa. Chromosome number: not known. Flowering time: September - October. Habitat: dry slopes of mountains, elevation ca. 6,000 ft. Range: Mexico; Jalisco. Figure 2.

Holotype: Mexico; Jalisco, mountainside above Etzatlan, Pringle 8855 (GH). Isotypes at TEX and US.

Crotalaria mexicana is a new species, the representatives of which were referred by Senn (1939) to C. sagittalis var. fruticosa (here treated as C. sagittalis var. sagittalis). Crotalaria mexicana is most similar to C. sagittalis and C. quercetorum. It differs from C. sagittalis in its lack of stipules and absence of spreading pubescence and from C. quercetorum in its short thick peduncles and in its dense pubescence.



Crotalaria mexicana is characterized by its erect habit, dense, appressed pubescence, lack of stipules, and extremely short, leaf-opposed peduncles.

Representative specimens:

MEXICO.--Jalisco: near Etzatlan, Pringle 8855 (=type), Pringle 11807 (GH, US), Rose & Painter 7571 (US); near Guadalajara, Rose & Painter 7469 (US).

CROTALARIA NAYARITENSIS Windler, sp. nov.

Herba annua vel perennis radice polari usque 1.5 cm crassa. Caules 1-multi, 6-12 dm longi, 1.5-2.5 mm crassa, internodium longissimum 3.8-10 cm long, trichomis densis adpressis, 0.2-0.7 mm longis. Stipulae decurrentes per longitudinem internodii, 0.15-1.1 cm latae ad apicem, decrescentes ad vel trans nodum subtentem, lobi stipulares paralleli ad caulem vel patentes, 0.1-1.3 cm longi. Folia ovalia elliptica ovata, anguste ovata, oblonga vel lanceolata, 3.5-7.8 cm longa, 7-26 mm lata, ad basim obtusa vel cuneata, ad apicem obtusa, mucronata, acuminata, vel acuta, trichomis 0.3-0.8 mm longis, adpressis vel laxe adpressis; petioli 1.2-2.5 mm longi.

Inflorescentia foliis opposita, pedunculo 3.2-16 cm longo. Bracteae sessiles, lineares vel elliptico-lanceolatae, 3-4.5 mm longae, 0.2-0.5 mm latae; pedicellus 2.8-3.8 mm longus; calyx 7.5-12 mm longus, tubo 2-3.2 mm longo, trichomis 0.1-0.5 mm longis adpressis; bracteola linearis vel anguste lanceolata, 1.5-3 mm longa, 0.2-0.3 mm lata. Corolla lutea, vexillum 7-12.5 mm longum, 2 mm brevior usque 1 mm longior lobi superis calycis; antherae elongatae 1.3-2.1 mm longae, antherae breves 0.4-0.5 mm longae; stylus 5-6 mm longus. Fructus 1.3-2.3 cm longi, 0.5-0.8 cm lati; semina 30-35 per legumen, 1.6-2.4 mm longa, olivacea, brunnea, vel rubiginosa. Chromosome number: $n=16$. Flowering time: August - February. Habitat: steep moist slopes and pine woods, elevation 2,500 - 6,600 feet. Range: Mexico; Jalisco, Nayarit. Figure 3.

Holotype: D. R. Windler & B. K. Windler 2902 (NCU)

Type locality: Mexico: Nayarit, North of Compostella (near Km. 24), about 7 miles southwest of Tepic, along road between Tepic and Compostella. Road-cut through mountain on moist steep slope.

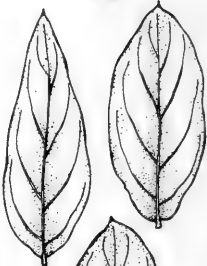
Crotalaria nayaritensis is a new species named for the Mexican state from which the holotype was collected. It is characterized by its spreading or diffuse habit, leaf-opposed inflorescences, small flower size, and appressed pubescence.

Figure 2. Crotalaria mexicana. A. Habit and leaf variation. B. Stem. C. Leaf pubescence.

1 cm



B



2 cm



A

Of the Mexican species it most nearly resembles C. bupleurifolia, but differs from it in having a smaller flower, appressed pubescence, and usually narrower stipules.

Representative specimens:

MEXICO.--Jalisco: 13 mi. SW of Autlan, 1,000 m, McVaugh 19886 (MICH); Llano Verde, municipio de Tecalitlan, 1,600 m, Rzedowski 17417 (MICH); 3 mi. S of Mazamitla, 2,100-2,200 m, McVaugh 12997 (MICH, US); San Sebastian, W to Mascota, 1,425 m, Mexia 1408 (US); Tepic, Palmer 1869 (NY, US); Nayarit: 10 mi. SE of Ahuacatlan, 1,100 - 1,300 m, Fedema 287 (MICH); N of Compostella, 3,000 ft., Windler & Windler 2902 (NCU); Mina Esperanza Rosa Morada, Ortega 6682 (US); 2 mi. N of Tepic, 3,000 ft., Windler & Windler 2897 (NCU).

CROTALARIA NITENS HBK. 1824, Vol. 6, p. 399.

In North America Crotalaria nitens variety nitens is known only from the Mexican states of Chiapas, Oaxaca, and Veracruz. The plants of the species tend to be shrubby, have terminal inflorescences, lack decurrent stipules, and have relatively large flowers. Variety gracilis may be separated from variety nitens in the following way:

Peduncles stout, 1-2 mm thick; bracts 7.5-14 mm long, 1.2-3 mm wide. C. nitens var. nitens
 Peduncles slender, 0.5-0.6 mm thick, bracts 4-5 mm long, 0.6-0.8 mm wide. C. nitens var. gracilis

CROTALARIA NITENS HBK var. GRACILIS Windler, var. nov.

Differt a var. nitenti pedunculis tenuibus (0.5-0.6 mm crassis) et bracteis parvis (4.5 mm longis, 0.6-0.8 mm latis).

Holotype: McVaugh & Koelz 1188 (MICH).

Type locality: Mexico: Jalisco; Sierra de Halo, logging road 7 miles south southwest of Tecalitlan and extending southeast toward San Isidaro, 13 - 16 miles from highway.

CROTALARIA ROTUNDIFOLIA [Walt.] Gmelin, 1792, Tome II, p. 1095.

The plants which I have ascribed to this species were treated by Senn (1939) under two specific names: Crotalaria angulata and C. maritima. Senn listed the epithet rotundifolia as a synonym for C. angulata Miller. Fernald and Schubert (1948) in publishing discussions of American types in British herbaria, indicated that the name C. rotundifolia actually applied to the plants Senn had treated as C. maritima.

Figure 3. Crotalaria nayaritensis. A. Habit and leaf variation. B. Stem.

During the present study, the two taxa were judged to be cospecific. The earliest name which appeared to apply to the species was C. angulata, a name Miller had based on a plant grown from seed from Campeche.

The application of this epithet is in question for several reasons.

1. Britten and Baker (1897) indicate the type does not differ from C. biflora L., an Asian plant. This observation has been confirmed by Dr. Robson of the British Museum (Personal communication, Nov. 1968, in a letter to S. W. Leonard).
2. No plants referable to C. angulata of Senn have been observed from the vicinity of Campeche.
3. Miller's description of C. angulata does not match the application of Senn or the available type in the Miller Herbarium.

Since these points seem to indicate one or possibly more errors, I feel that the name should be rejected as a source of confusion (ICBN Articles 69 & 70).

After rejection of Crotalaria angulata, the earliest name which applies to the plants of the species is C. rotundifolia [Walt.] Gmelin. Two varieties, based on Senn's species, C. angulata and C. maritima, are recognized. Crotalaria rotundifolia variety rotundifolia is the plant with appressed pubescence referred to C. maritima by Senn. The other variety is designated in the following way:

CROTALARIA ROTUNDIFOLIA var. VULGARIS Windler, var. nov.

Crotalaria angulata Miller, 1768, sensu Senn, 1939.
(See discussion above.)

Differt a C. rotundifolia var. rotundifolia pubescentia patenti in caule, foliis, pedunculo, et calyce.

Holotype: D. R. Windler and B. K. Windler 2769 (NCU)

Type locality: South Carolina; Hampton County, about three miles northwest of Yemassee on South Carolina Highway 68. Sandhill. 23 July 1967.

Crotalaria rotundifolia var. vulgaris is distinguished by its spreading pubescence. Over most of its range var. vulgaris is also characterized by round to oval leaves, but in northern Florida and southern Georgia it intergrades with the usually narrower leaved var. rotundifolia.

CROTALARIA BUPLEURIFOLIA Schlechtendal & Chamisso, 1830, Vol. 5, p. 575.

Crotalaria heldiana A. DC. in A. & A.P. DC., 1841. Vol. 9, p. 97. (Type: Grown from seed of unknown source in the garden at Carlsruhe. G!)

Crotalaria bupleurifolia is characterized by its large size, unusual stipules and large habit and flowers. The two varieties may be distinguished in the following way:

Stipules present only at the base of peduncles, decurrent for only a single internode.
 C. bupleurifolia var. bupleurifolia
 Stipules present at the base of most leaves, frequently decurrent for more than one internode.
 C. bupleurifolia var. robusta

CROTALARIA BUPLEURIFOLIA var. ROBUSTA (Senn) Windler, stat. nov.

Crotalaria pilosa var. robusta Senn, 1939, Vol. 41, p. 331.

Type locality: Temascaltepec, Cumbre de Tejupilco.

(Holotype: Hinton 2686 US!)

This variety was originally described by Senn under Crotalaria pilosa because of its stipules which wing the stem for more than one internode. However, the variety lacks the terminal inflorescence and small flower size of C. pilosa. Variety robusta's overall similarity to C. bupleurifolia var. bupleurifolia in habit, inflorescence, and flower structure were used to place the variety into C. bupleurifolia.

Representative specimens:

MEXICO.--Jalisco: 10 Km al N de La Cuesta, sobre el camino a Talpa, 1,100 m, Rzedowski 15134 (MEXU); Mexico: Plaza de Gallos, 1,200 m, Hinton 4595 (GH, NY); Sinaloa: Km 1206 on Mexico Hwy. 40, ca. 30 mi. E of Mazatlan-Guadalajara Junction, 2,700 ft., Windler & Windler 2869 (NCU).

Literature Cited

- Britten, J. and E. G. Baker
 1897. Houstoun's Central American Leguminose. Journal of Botany, 35:225-234.
 Candolle, A.P., and A. de
 1841. Memoires de la Societe de Physique et d'Histoire Naturelle de Geneve, 9:97.
 Fawcett, W. and A. Rendle
 1920. Flora Jamaica. 5 Volumes, incomplete. London.

Fernald, M. and B. Schubert

1948. Studies of American types in British Herbaria, IV.
Some species of Thomas Walter. Rhodora, 50:190-208.

Gmelin, J.

1792. in Caroli Linne....Systema Naturae. Tomus II.
7 volumes in 3 Tomes. Leipzig.

Humboldt, F., A. Bonpland, and C. Kunth.

1824. Voyage aux Regions Equinociales de Nouveau Continent
....Nova Genera et Species Plantarum. 7 volumes.
Paris.

Miller, P.

1768. The Gardeners Dictionary. Edition 8. London.

Schlechtendal, D. and A. Chamisso

1830. Plantarum Mexicanarum. Linnaea, Volume 5. 756 pages.
Berlin.

Senn, H.

1939. The North American species of Crotalaria. Rhodora,
41:317-366.

Windler, D.

1970. Systematic studies in Crotalaria sagittalis and related
species. Unpublished dissertation, University of
North Carolina at Chapel Hill. 258 pages.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXVI

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: L., Gen. Pl., ed. 2, 35 & [536] (1742), ed. 3 ["2"], 29 & [421] (1743), ed. 4, 29 & [450] (1752), and ed. 6, 40 & [589] and Ord. Nat. P.p.5.I.Bur. 1764; J. Hill, Herb. Brit. 1: 96*—99*, pl. 66 [some copies]. 1769; Hope, Phil. Trans. Roy. Soc. Lond. 59: 241—246, pl. 12. 1770; Druce, Brit. Pl. List, ed. 2, 118. 1928; Druce, Comital Fl. 320. 1932; Schipp, 1933—34 Pricelist 57. 1934; Hausman, Begin. Guide Wild Fls. 4. 1948; Ohwi, Journ. Jap. Bot. 33: 211. 1958; Eden, McGill Univ. Savanna Res. Ser. 1: 135—137 & 144. 1964; Majumdar, Bull. Bot. Soc. Bengal 19: 15. 1965; Brummitt, Ind. Europ. Tax. Lit. 1965: 80. 1966; Datta & Majumdar, Bull. Bot. Soc. Bengal 20: 18 & 38—39. 1966; Rzedowski & McVaugh, Contrib. Univ. Mich. Herb. 9: 76 & 89. 1966; Moldenke, Biol. Abstr. 47: 754 (1966) and 48: xcii, 10097, & 10099. 1967; J. & A. Raynal, Adansonia, nouv. sér., 7: 302 & 329. 1967; Adam, Adansonia, nouv. sér., 8: 445. 1968; Tiwari, Indian Forest. 94: 579. 1968; Dandy, Watsonia 7: 168—174, fig. 1—5. 1969; Duke, Ann. Mo. Bot. Gard. 56: 128 & 129. 1969; Santapau & Shah, Journ. Bombay Nat. Hist. Soc. 66: 440. 1969; Moldenke, Biol. Abstr. 51: 5587, 9023, 9629, & 11903. 1970; Anon., Biol. Abstr. 51 (10): B.A.S.I.C. S.24, S.32, S.44, S.70, & S.71 (1970), 51 (16): B.A.S.I.C. S.25, S.46, S.74, & S.126 (1970), 51 (17): B.A.S.I.C. S.72 (1970), 51 (19): B.A.S.I.C. S.75 (1970), and 51 (21): B.A.S.I.C. S.25, S.75, & S.122. 1970; Moldenke, Phytologia 20: 339—368 & 404—425. 1970; Lasser, Act. Bot. Venez. 4: 35. 1970; Ehrendorfer, Taxon 19: 600. 1970; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1969: 26. 1970; Rogerson, Rickett, & Becker, Bull. Torrey Bot. Club 97: 238. 1970; Amaratunga, Phytologia 20: 463. 1970; D. P. Young, Biol. Abstr. 51: 10775. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Lundell, Contrib. Tex. Res. Found. Bot. 6:] 20, 352—354, 1806, 1824, 1838, & 1856. 1970; Oberwinkler, Pterid. & Sperm. Venez. 7 & 9. 1970; Lowden, Taxon 19: 845. 1970; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo 2: xxxii, xxxiii, & xxxv. 1970; Adam, Bull. Inst. Fond. Afr. Noire A.32: 1003. 1970; Moldenke, Phytologia 20: 504—510. 1971; Moldenke, Biol. Abstr. 52: 132, 714, 719, & 1918. 1971; Anon., Biol. Abstr. 52 (1): B.A.S.I.C. S.147 & S.175 (1971), 52 (2): B.A.S.I.C. S.80, S.133, & S.251 (1971), 52 (3): S.78 & S.129 (1971), and 52 (4): B.A.S.I.C. S.26, S.35, S.77, & S.165. 1971.

BLASTOCAULON Ruhl.

Additional bibliography: Moldenke, Phytologia 20: 340, 422, & 423. 1970; Moldenke, Biol. Abstr. 51: 5587, 9023, & 11903. 1970; Anon., Biol. Abstr. 51 (10): B.A.S.I.C. S.24, S.32, & S.44 (1970), 51 (16): B.A.S.I.C. S.25, S.46, & S.74 (1970), 51 (21): B.A.S.I.C. S.25 (1970), 52 (2): B.A.S.I.C. S.27 & S.37 (1971), and 52 (4): B.A.S.I.C. S.26,

S.35, & S.77. 1971; Moldenke, *Phytologia* 20: 504. 1971; Moldenke, *Biol. Abstr.* 52: 719 & 1918. 1971.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Additional bibliography: Anon., *Biol. Abstr.* 51 (16): B.A.S.I. C. S.25. 1970; Moldenke, *Phytologia* 20: 340. 1970; Moldenke, *Biol. Abstr.* 51: 9023. 1970.

Mexia describes this plant as abundant, forming colonies, with white flowers in May.

Additional citations: BRAZIL: Minas Gerais: *Mexia* 5779 (Go).

CARPTOTEPALA Moldenke

Additional bibliography: Anon., *Biol. Abstr.* 51 (10): B.A.S.I. C. S.24, S.32, & S.44. 1970; Moldenke, *Biol. Abstr.* 51: 5587. 1970; Oberwinkler, *Pterid. & Sperm. Venez.* 9 & 52. 1970; Moldenke, *Phytologia* 20: 340--341 (1970) and 20: 505. 1971; Moldenke, *Biol. Abstr.* 52: 719 & 1918. 1971; Anon., *Biol. Abstr.* 52 (2): B.A.S.I. C. S.25, S.37, S.50, & S.80 (1971) and 52 (4): B.A.S.I.C. S.26, S.35, S.77, & S.165. 1971.

CARPTOTEPALA JENMANI (Gleason) Moldenke

Additional bibliography: Moldenke, *Phytologia* 20: 341. 1970; Oberwinkler, *Pterid. & Sperm. Venez.* 9 & 52. 1970.

COMANTHERA L. B. Sm.

Additional bibliography: Anon., *Biol. Abstr.* 51 (10): B.A.S.I. C. S.24, S.32, & S.44 (1970) and 51 (16): B.A.S.I.C. S.46. 1970; Moldenke, *Biol. Abstr.* 51: 5587. 1970; Moldenke, *Phytologia* 20: 246 (1970) and 20: 505. 1971; Moldenke, *Biol. Abstr.* 52: 719. 1971; Anon., *Biol. Abstr.* 52 (2): B.A.S.I.C. S.27, S.37, S.50, S.80, & S.145. 1971.

ERIOCAULON Gron.

Additional synonymy: *Eriocaulon* Moldenke, *Biol. Abstr.* 51: 5587, sphalm. 1970. *Eriocaulon* (Vell.) L. B. Sm., in herb.

Additional & emended bibliography: L., *Gen. Pl.*, ed. 2, 35 & [536] (1742), ed. 3 ["2"], 29 & [421] (1743), ed. 4, 29 & [450] (1752), & ed. 6, 40 & [589] and *Ord. Nat. P.p.5.I.Bur.* 1764; J. Hill, *Herb. Brit.* 1: 96*-99*, pl. 66 [some copies]. 1769; Hope, *Phil. Trans. Roy. Soc. Lond.* 59: 241--246. 1770; Druce, *Brit. Pl. List*, ed. 2, 118. 1928; Druce, *Comital Fl.* 320. 1932; Schipp, 1933--34 *Pricelist* 57. 1934; Hausman, *Begin. Guide Wild Fls.* 4. 1948; Ohwi, *Journ. Jap. Bot.* 33: 211. 1958; Eden, *McGill Univ. Savanna Res. Ser.* 1: 144. 1964; Majumdar, *Bull. Bot. Soc. Bengal* 19: 15. 1965; Rzedowski & McVaugh, *Contrib. Univ. Mich. Herb.* 9: 76 & 89. 1966; J. & A. Raynal, *Adansonia*, nouv. sér., 7: 302 & 329. 1967; Tiwari, *Indian Forest.* 94: 579. 1968; Dandy, *Watsonia* 7: 168--174, fig. 1--5. 1969; Santapau & Shah, *Journ. Bombay Nat. Hist. Soc.* 66: 440. 1969; Moldenke, *Biol. Abstr.* 51: 5587, 9023, 9629, & 11903. 1970; Moldenke in Correll & Johnston, *Man, Vasc. Pl. Tex.* [Lundell, *Contrib. Tex. Res. Found. Bot.* 6:] 353--354,

1824, & 1856. 1970; Oberwinkler, Pterid. & Sperm. Venez. 7, 9, & 52. 1970; Moldenke, Phytologia 20: 341—351, 356, 357, 364, 404—418, 420, & 422—425. 1970; Lowden, Taxon 19: 836. 1970; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo 2: xxxii. 1970; D. P. Young, Biol. Abstr. 51: 10775. 1970; Anon., Biol. Abstr. 51 (10): B.A.S.I.C. S.70 & S.71 (1970), 51 (16): B.A.S.I.C. S.25, S.74, & S.126 (1970), 51 (17): B.A.S.I.C. S.72 (1970), 51 (19): B.A.S.I.C. S.75 (1970), 51 (21): B.A.S.I.C. S.75 (1970), 52 (2): B.A.S.I.C. S.37, S.50, S.80, & S.145 (1971), and 52 (4): B.A.S.I.C. S.26, S.35, S.77, & S.165. 1971; Moldenke, Biol. Anstr. 52: 719 & 1918. 1971; Moldenke, Phytologia 20: 506 & 508. 1971.

The Degelius s.n. [4/VI/1958], distributed as Eriocaulon sp., is actually Paepalanthus lamareckii Kunth.

ERIOCAULON AQUATICUM (J. Hill) Druce

Emended synonymy: Eriocaulon septangulare L. ex Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 11. 1835.

Additional & emended bibliography: J. Hill, Herb. Brit. 1: 96*—99*, pl. 66 [some copies]. 1769; Hope, Phil. Trans. Roy. Soc. Lond. 59: 241—246, pl. 12. 1770; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 11, 22, 38, & 58, pl. 2, fig. 2. 1835; Körn. in Mart., Fl. Bras. 3 (1): 280, 489, & 502—505. 1893; Druce, Brit. Pl. List, ed. 2, 118. 1928; Solomon, Journ. Indian Bot. Soc. 10: 139—144. 1931; Druce, Comital Fl. 320. 1932; R. M. Adam, New Fl. & Silv. 6, no. 1. 1933; Muenscher, Aquat. Pl. U. S. 192—195 & 367, fig. 84 H—J & 85 A & B, map 208. 1944; Hare, Journ. Linn. Soc. Lond. Bot. 53: 422—448, fig. 6—40, pl. 22. 1950; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 169 & 173. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 149, 154, 155, 159—163, 168—172, 175—177, 186, 189, 190, & 192, fig. 32 G—I & K, 35 J, & 36 L. 1969; Dandy, Watsonia 7: 168—174, fig. 1—5. 1969; R. G. West in Walker & West, Stud. Veg. Hist. Brit. Isles 9. 1970; Moldenke, Biol. Abstr. 51: 5587 & 9023. 1970; Moldenke, Phytologia 20: 19—20, 41, & 82. 1970; Mohlenbrock, Illust. Fl. Ill. Flow. Pl. Flow. Rush 249. 1970; D. P. Young, Biol. Abstr. 51: 10775. 1970; Anon., Biol. Abstr. 51 (19): B.A.S.I.C. S.75. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Lundell, Contrib. Tex. Res. Found. Bot. 6:] 353, 354, & 1824. 1970.

Additional & emended illustrations: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): pl. 2, fig. 2. 1835; Hare, Journ. Linn. Soc. Lond. Bot. 53: [429, 432, 435], 437, 440, & 442, fig. 6—40, pl. 22. 1950; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 154, 168, & 176, fig. 32 G—I & K, 35 J, & 36 L. 1969; Dandy, Watsonia 7: 170, fig. 1. 1969.

The Martius (1835) reference cited above is often cited as "1833", the date of its submission for publication, but Dr. J. H. Barnhart says "I can find no evidence that this paper was published until 1835".

This species has been regarded as properly named E. septangulare With. up to the present in my publications. I have referred from time to time in the past to the name Cespa aquatica J. Hill,

but was unable to find incontrovertible evidence that it had been published validly under the present rules of botanic nomenclature. Now, however, the matter has been investigated thoroughly by Dandy (1969) and his extremely important discussion of the matter is reproduced here for the benefit of readers who may not have the journal in which he published his results available in their library:

"In 1909 G. C. Druce drew attention to the existence in his copy of Hill's Herbarium Britannicum (vol. 1: 1769) of an additional plate 66 illustrating, with dissections, a genus Cespa with the single species C. aquatica ('Water Turffwort'). The species depicted was Eriocaulon septangulare, described under that name by Withering in 1776, and so Druce on grounds of priority published the new combination E. aquaticum (Hill) Druce. For some reason Druce in his later works did not persist in the use of the name E. aquaticum; thus in his British plant list ed. 2, 118 (1928), he retained the name E. septangulare (with E. aquaticum cited as a synonym), and in his Comital Flora, 320 (1932), he used the name E. septangulare without mention of E. aquaticum. Possibly he now thought his combination E. aquaticum to be invalidated by E. aquaticum Sagot ['Mss. in Herb. Sagot.'] ex Koern. in Mart., Fl. Brasil. 3 (1), 489 (1863); but this name was published only as a synonym of E. melanocephalum Kunth and so cannot invalidate E. aquaticum (Hill) Druce.

"The additional plate 66 present in Druce's copy of the Herbarium Britannicum does not appear in all copies of the work; but at the British Museum, Bloomsbury, and at the Linnean Society of London there are copies which contain not only this additional plate but also four additional pages of text (numbered 96*—99*) in which Cespa aquatica is described at length. These extra pages and plate.....were presumably not issued soon enough for inclusion in all copies of the Herbarium Britannicum. According to Hill's statement on p. 96* the plant concerned had been collected in the previous year ('mense Septemb. anni elapsi') on the island of Skye by James Robertson, and had been communicated to Hill, with an illustration and description, by John Hope of Edinburgh. Hope himself published an account of it in Phil. Trans. Lond. 59, 241—246, t. 12 (1770), in which he stated that it had been found by Robertson in September 1768. Thus Hill's 'anni elapsi' was 1768, so that his additional pages and plate were issued, or at least printed, in 1769. Hill in any case died in 1775, before Withering's publication of E. septangulare in 1776.

"Hope correctly placed the plant in Eriocaulon, but misidentified it with E. decangulare L., a species confined to North America. Hill, on the other hand, treated it as forming a new genus, Cespa, which, according to his footnote on p. 98*, he considered to differ from Eriocaulon in having the corolla 'depetala', Eriocaulon being 'tripetalum'. Hope mentioned the plant's vegetative resemblance to 'Calamaria Dill. Musc. Tab. 80' (Isoetes L.) in

which, however, a flowering stem was unknown; Hill's footnote on p. 96* makes the same point."

All the discussion, therefore, given by me in these notes previous to the present date under E. septangulare, including bibliography, list of illustrations, and citations, should be transferred to E. aquaticum.

Additional citations: EIRE: Galway Co.: Anderberg s.n. [1/18/1933] (Go).

ERIOCAULON AQUATILE Körn.

Additional bibliography: Moldenke, *Phytologia* 20: 343. 1970.

Irwin and Soderstrom describe this plant as an "aquatic herb, in rushing water; heads gray, erect, emerging from water, infrequent", and found it at altitudes of 700--1000 meters.

Additional citations: BRAZIL: Distrito Federal: Irwin & Soderstrom 5822 (N).

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.

Additional bibliography: J. & A. Raynal, *Adansonia*, nouv. sér., 7: 302. 1967; Moldenke, *Phytologia* 20: 344. 1970.

ERIOCAULON BILOBATUM Morong

Additional bibliography: Moldenke, *Phytologia* 20: 7. 1970.

Breedlove found this plant growing in flat areas with forests of Pinus, Quercus, and Arbutus and many small ponds, at 7500 feet altitude, flowering and fruiting in November.

Additional citations: MEXICO: Durango: Breedlove 18844 (Rf).

ERIOCAULON BONGENSE Engl. & Ruhl.

Additional & emended bibliography: J. & A. Raynal, *Adansonia*, nouv. sér., 7: 302 & 329. 1967; Moldenke, *Phytologia* 19: 326. 1970.

ERIOCAULON CAPITULATUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 20: 346. 1970.

The species has been found growing on steep moist slopes with Pinus, Quercus, and Arbutus, at 7900 feet altitude, flowering and fruiting in November.

Additional citations: MEXICO: Durango: Breedlove 18780 (Z).

ERIOCAULON CINEREUM R. Br.

Additional bibliography: Majumdar, *Bull. Bot. Soc. Bengal* 19: 15. 1965; Moldenke, *Phytologia* 20: 346--347. 1970.

Rogerson found this plant growing in moist rice-paddies, flowering and fruiting in October.

Additional citations: PHILIPPINE ISLANDS: Luzon: Rogerson 1099 (N).

ERIOCAULON COLLINUM Hook. f.

Additional bibliography: Moldenke, *Phytologia* 20: 347. 1970.

Koyama & Herat found this plant growing on the wet margins of narrow streams in the bottom of swampy depressions in black Pat-

ana grasslands in Ceylon, in association with Fimbristylis monticola and Carex arnottiana, at 7200 feet altitude, flowering and fruiting in May.

Additional citations: CEYLON: Koyama & Herat 13641 (N).

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353, 354, & 1824. 1970; Moldenke, Phytologia 20: 347. 1970.

ERIOCAULON CRISTATUM Mart.

Additional bibliography: Moldenke, Phytologia 20: 348. 1970.

The species has been found growing in bogs, flowering and fruiting in July.

Additional citations: INDIA: Khasi States: Kingdon-Ward 18695 (N).

ERIOCAULON DALZELLII Körn.

Additional bibliography: Moldenke, Phytologia 20: 348. 1970.

Koyama reports this species as occasional in wet depressions in black Patana grasslands, in association with Gentianella, at 7000 feet altitude, flowering and fruiting in March.

Additional citations: CEYLON: Koyama 13516 (N).

ERIOCAULON DECANGULARE L.

Additional bibliography: Hausman, Begin. Guide Wild Fls. 4. 1948; Dandy, Watsonia 7: 169. 1969; Moldenke, Phytologia 20: 348-349, 404, & 417. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C. S.74. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353 & 1824. 1970.

Henderson reports finding this plant growing in swampy roadsides.

Additional citations: FLORIDA: Wakulla Co.: N. C. Henderson 64-245 (Go).

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, Phytologia 20: 404. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C. S.74. 1970.

ERIOCAULON DIANAE Fyson

Additional bibliography: Santapau & Shah, Journ. Bombay Nat. Hist. Soc. 66: 440. 1969; Moldenke, Phytologia 20: 405. 1970.

Santapau & Shah (1969) record this species from Salsette Island, India.

ERIOCAULON DIANAE var. LONGIBRACTEATUM Fyson

Additional bibliography: Santapau & Shah, Journ. Bombay Nat. Hist. Soc. 66: 440. 1969; Moldenke, Phytologia 20: 405. 1970.

Santapau & Shah (1969) record this variety from Salsette Island, India.

ERIOCAULON ELENORAE Fyson

Additional bibliography: Santapau & Shah, Journ. Bombay Nat. Hist. Soc. 66: 440. 1969; Moldenke, Phytologia 19: 335—336. 1970.

Santapau & Shah (1969) record this species from Salsette Island, India.

ERIOCAULON GIBBOSUM Körn.

Additional bibliography: Moldenke, Phytologia 20: 407—408. 1970.

Irwin and his associates describe the flowering-heads of this plant as "gray" and encountered the plant growing in periodically flooded campos at 400 meters altitude.

Additional citations: BRAZIL: Mato Grosso: Irwin, Souza, Grear, & Reis dos Santos 16981 (Rf).

ERIOCAULON GIBBOSUM var. LONGIFOLIUM Körn.

Additional bibliography: Moldenke, Phytologia 20: 408. 1970.

Irwin & Soderstrom describe the flowering-heads of this plant as "grayish" and found it to be common in muddy soil of periodically flooded meadows, flowering and fruiting in September.

Additional citations: BRAZIL: Distrito Federal: Irwin & Soderstrom 6134 (N).

ERIOCAULON HERZOGII Moldenke

Additional bibliography: Moldenke, Phytologia 20: 410. 1970; Anon., Biol. Abstr. 51 (10): B.A.S.I.C. S.24 & S.71. 1970; Moldenke, Biol. Abstr. 51: 5587. 1970.

ERIOCAULON HEUDELII N. E. Br.

Additional bibliography: J. & A. Raynal, Adansonia, nouv. sér., 7: 302. 1967; Moldenke, Phytologia 20: 410. 1970.

ERIOCAULON HOOKERIANUM Stapf

Additional bibliography: Moldenke, Phytologia 20: 411. 1970.

The Clemenses found this species growing by pools in the open.

Additional citations: GREATER SUNDA ISLANDS: Sarawak: Clemens & Clemens 20094 (N).

ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Moldenke, Phytologia 20: 411. 1970; Oberwinkler, Pterid. & Sperm. Venez. 9 & 52. 1970.

Irwin and his associates describe the inflorescences of this plant as attaining a height of 1 meter, the heads being white, and the plant growing in wet campos at 850 meters altitude, flowering and fruiting in April.

Additional citations: BRAZIL: Bahia: Irwin, Grear, Souza, & Reis dos Santos 14742 (Rf).

ERIOCAULON INFIRMUM Steud.

Additional bibliography: Moldenke, Phytologia 20: 412. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C. S.74. 1970.

ERIOCAULON INFIRMUM var. KURZII (Fyson) Moldenke

Additional bibliography: Moldenke, Phytologia 20: 412. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C, S.74. 1970.

ERIOCAULON KÖRNICKIANUM Van Heurck & Muell.-Arg.

Additional bibliography: Moldenke, Phytologia 20: 413. 1970; Moldenke in Correll & Johnston, Man. Vasc. Pl. Tex. [Contrib. Tex. Res. Found. Bot. 6:] 353 & 1824. 1970.

ERIOCAULON KUNTHII Körn.

Additional bibliography: Moldenke, Phytologia 20: 413. 1970.

Additional citations: BRAZIL: Paraná: Hatschbach 22965 (N).

ERIOCAULON LASIOLEPIS Ruhl.

Emended synonymy: Lasiolepis brevifolia Böck., Flora 56: 90--91. 1873.

Additional & emended bibliography: Böck., Flora 56: 90--91. 1873; Moldenke, Phytologia 18: 258. 1969.

This species is said to be endemic to Malacca. Jackson (1894) credits it to "Ind. or."

ERIOCAULON LATIFOLIUM J. Sm.

Additional bibliography: Hocking, Excerpt. Bot. A.6: 455. 1963; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 172, & 189. 1969; Moldenke, Phytologia 20: 13, 25, 29, 268, & 281. 1970.

Graca Espirito Santo describes this plant as "erva aquatica anual, tufoza no leito pedregoso e cascalhento das linhas de água corrente", says that it has white flowers, reports the common names "orif" and "futafula", and collected it in anthesis in January.

The synonymous designation, E. rivulare G. Don, was based on a G. Don s.n. collection from a rivulet near Freetown, Sierra Leone, deposited in the herbarium of the Royal Horticultural Society in London.

Additional citations: REPUBLIC OF GUINEA: Graca Espirito Santo 2864 (N).

ERIOCAULON LAXIFOLIUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 290, 494, & 506. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402 (1894), pr. 2, 2: 402 (1946), and pr. 3, 2: 402. 1960; Moldenke, Phytologia 19: 73. 1969.

ERIOCAULON LEUCOGENES Ridl.

Additional bibliography: Moldenke, Phytologia 19: 66 & 73--74. 1969.

Hoogland reports this species as "common in treefern grassland", describes the flower-heads as white, and found the plant in anthesis in July.

Additional citations: NEW GUINEA: Territory of New Guinea: Hoogland 9398 (N).

ERIOCAULON LIGULATUM (Vell.) L. B. Sm.

Additional & emended bibliography: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 32. 1901; Rambo, Sellowia 7: 248 & 283. 1956; Moldenke, Phytologia 20: 13--14. 1970.

Additional citations: BRAZIL: Paraná: Hatschbach 22267 (N, Rf), 22557 (Ac).

ERIOCAULON LINEARE Small

Additional bibliography: Moldenke, Phytologia 20: 14 & 42. 1970.

Additional citations: FLORIDA: Leon Co.: N. C. Henderson 64-237 (Go).

ERIOCAULON LINEARIFOLIUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 601. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293, 498, & 507. 1863; Moldenke, Phytologia 19: 342. 1970.

This plant has been found in flower and fruit in August.

Additional citations: BRAZIL: Mato Grosso: Hatschbach & Guimarães 24560 (Rf).

ERIOCAULON LONGICUSPE Hook. f.

Additional bibliography: Moldenke, Phytologia 19: 75 (1969) and 19: 481. 1970.

ERIOCAULON LONGIPEDUNCULATUM H. Lecomte

Additional bibliography: Moldenke, Phytologia 2: 374 (1947) and 19: 75 & 93. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171--173, 186, & 189. 1969; Moldenke, Phytologia 19: 417. 1970.

ERIOCAULON LONGIROSTRUM Alv. Silv. & Ruhl.

Additional bibliography: Moldenke, Phytologia 2: 494 (1948) and 18: 271. 1969.

ERIOCAULON LUTCHUENSE Koidz.

Additional bibliography: Koyama in Ohwi, Fl. Jap. 268. 1965; Moldenke, Phytologia 18: 271--272 (1969) and 19: 250. 1970.

Koyama (1965) records the vernacular variant name for this plant, "okinawa-hoshi-kusa", and tells us that the plant differs from E. sikokianum Maxim. only in "Receptacle quite glabrous; floral bracts and calyces also not bearded; otherwise almost as in the typical variety".

ERIOCAULON LUZULAEFOLIUM Mart.

Additional bibliography: Santapau, Excerpt. Bot. A.11: 176. 1967; Moldenke, Phytologia 20: 14. 1970.

ERIOCAULON MACROBOLAX Mart.

Additional & emended bibliography: Körn., Linnaea 27: 599. 1856; Körn. in Mart., Fl. Bras. 3 (1): 484--485, 502, & 507, pl. 62, fig. 3. 1863; Moldenke, Phytologia 19: 76--77. 1969.

ERIOCAULON MAGNIFICUM Ruhl.

Additional bibliography: Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 77. 1969.

The Ule collection cited below was originally identified by Ruhland as C. ulaei Ruhl.

Additional citations: BRAZIL: Santa Catarina: Ule 1689 (Hg-isotype).

ERIOCAULON MAGNIFICUM var. **GOYAZENSE** Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 343. 1970.

ERIOCAULON MAGNUM Abbiatti

Additional bibliography: Moldenke, Phytologia 2: 374, 375, & 377 (1947) and 19: 77. 1969.

ERIOCAULON MALAISSEI Moldenke

Additional bibliography: Moldenke, Phytologia 19: 324 & 343--346, pl. 1. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C. S.74. 1970.

Illustrations: Moldenke, Phytologia 19: 344, pl. 1. 1970.

ERIOCAULON MALAISSEI f. **VIVIPARUM** Moldenke

Bibliography: Moldenke, Phytologia 19: 16 (1969) and 19: 345--346. 1970; Anon., Biol. Abstr. 51 (16): B.A.S.I.C. S.74. 1970.

ERIOCAULON MATOPENSE Rendle

Additional bibliography: Moldenke, Phytologia 3: 143 (1949), 18: 256 & 279 (1969), and 19: 459. 1970.

ERIOCAULON MELANOCEPHALUM Kunth

Emended synonymy: Lasiolepis aquatica Böck., Flora 56: 91--92. 1873.

Additional & emended bibliography: Böck., Flora 56: 91--92. 1873; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284--287, fig. 9 B 28. 1908; H. Hess, Bericht. Schweiz. Bot. Ges. 67: 87--89. 1957; Stauffer, Excerpt. Bot. A.2: 84. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 166, 180, 181, 184, 186, 187, & 191, fig. 38 K. 1969; Dandy, Watsonia 7: 168. 1969; Moldenke, Phytologia 20: 14. 1970.

Additional illustrations: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 285, fig. 9 B 28. 1908; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 180, fig. 38 K. 1969.

Meikle believes that E. melanocephalum should be reduced to synonymy under E. setaceum L. -- thus differing from Hess who maintains it as the proper name for what is usually called E. bifistulosum Van Heurck & Muell.-Arg.

Hunt & Ramos describe E. melanocephalum as an "aquatic herb rooted in mud in slow-moving or still water of pond, flower-heads black, but 6 filaments white", flowering and fruiting in June.. Meikle identified their collection as E. setaceum L. Philcox &

Freeman call the plant a "floating aquatic; heads blue-black", and found it flowering and fruiting in March.

Additional citations: BRAZIL: Mato Grosso: Hunt & Ramos 5909 (N); Philcox & Freeman 4639 (N).

ERIOCAULON MELANOCEPHALUM var. LONGIPES Griseb.

Additional & emended bibliography: Moldenke, *Phytologia* 1: 319, 351, & 363 (1939) and 18: 301. 1969; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 191. 1969.

ERIOCAULON MELANOCEPHALUM ssp. USTERIANUM Beauverd

Additional & emended bibliography: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 284--287, fig. 9 B 15--27. 1908; Moldenke, *Phytologia* 19: 78. 1969.

Emended illustrations: Beauverd, *Bull. Herb. Boiss.*, sér. 2, 8: 285, fig. 9 B 15--27. 1908.

ERIOCAULON MERRILLII Ruhl.

Additional bibliography: K. U. Kramer, *Excerpt. Bot. A.* 6: 33. 1963; Moldenke, *Phytologia* 19: 346, 420, 477, & 478 (1970) and 20: 31. 1970.

A vernacular name recorded for this plant in Sumatra is "si landit tano".

Additional citations: GREATER SUNDA ISLANDS: Sumatra: Boeea 10343 (N).

ERIOCAULON MESANTHEMOIDES Ruhl.

Additional bibliography: Moldenke, *Phytologia* 2: 375 (1947), 19: 346 & 487 (1970), and 20: 284. 1970.

ERIOCAULON MEXICANUM Moldenke

Additional & emended bibliography: Moldenke, *Phytologia* 1: 319--320, 350, & 360. 1939; Hocking, *Excerpt. Bot. A.* 13: 510. 1968; Moldenke, *Phytologia* 19: 347. 1970.

ERIOCAULON MICROCEPHALUM H.B.K.

Additional bibliography: J. F. Macbr., *Field Mus. Publ. Bot.* 13 (363): 489--490. 1936; Moldenke, *Phytologia* 20: 14, 424, & 425. 1970.

Sparre found this plant growing in marshland in the transition zone to quebrada vegetation. Iltis & Ugent found it in wet springy areas with huge hard cushions of Distichia muscoides, Scirpus, and Gentiana, at 4250 meters altitude.

Macbride (1936) cites F. W. Pennell 13864, Raimondi s.n., and Weberbauer 2269 from Peru.

Additional citations: MEXICO: México: Pringle 13228 (Mi). EC-UADOR: Carchi: Sparre 14260 (S). PERU: Cuzco: Iltis & Ugent 1257 (W--2542293).

ERIOCAULON MIKAWANUM Satake & Koyama

Additional synonymy: Eriocaulon sikokianum var. mikawanum (Sa-

take & Koyama) Koyama in Ohwi, Fl. Jap. 269. 1965.

Additional bibliography: Koyama in Ohwi, Fl. Jap. 269. 1965; Moldenke, Phytologia 18: 307—308. 1969.

Koyama (1965) records the vernacular variant Japanese name "mikawa-inu-no-hige" for this plant and affirms that the plant is known only from Tsukude Moor in Mikawa Province on Honshu Island.

ERIOCAULON MINUSCULUM Moldenke

Additional bibliography: Moldenke, Phytologia 18: 309. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON MINUTISSIMUM Ruhl.

Additional & emended bibliography: Moldenke, Phytologia 1: 320, 351, & 355. 1939; Moldenke, Alph. List Cit. 1: 187. 1946; Moldenke, Phytologia 18: 309. 1969.

ERIOCAULON MIQUELIANUM Körn.

Additional synonymy: Eriocaulon miquelianum var. miquelianum Koyama in Ohwi, Fl. Jap. 269. 1965.

Additional bibliography: Moldenke, Phytologia 2: 494 (1948) and 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266, 268, & 269. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171 & 173. 1969; Moldenke, Phytologia 19: 347, 348, 416, 454, & 456 (1970) and 20: 411. 1970.

Koyama (1965) records the vernacular variant "inu-no-hige" for this species.

ERIOCAULON MIQUELIANUM var. **ATROSEPALUM** Satake

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 269. 1965; Moldenke, Phytologia 13: 311. 1969.

Koyama (1965) records the vernacular variant name for this plant, "takayo-inu-no-hige", states that the taxon differs from typical E. miquelianum only in having the "heads few-flowered, receptacle pilose, and pistillate calyxes blackish", and that it occurs only in Uzen Province on Honshu Island.

ERIOCAULON MISERRIMUM Ruhl.

Additional & emended bibliography: Moldenke, Phytologia 1: 320, 351, & 355. 1939; Moldenke, Alph. List Cit. 1: 92 & 186. 1949; Moldenke, Phytologia 18: 312. 1969.

ERIOCAULON MISERUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 579, 584, & 607—608. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293 & 503. 1863; Santapau, Excerpt. Bot. A.11: 176. 1967; Moldenke, Phytologia 19: 347. 1970.

ERIOCAULON MISSIONUM Castell.

Additional bibliography: Moldenke, Phytologia 2: 375 & 378 (1947) and 18: 313. 1969.

To be continued

OBSERVATIONS ON MENTZELIA IN SOUTHERN CALIFORNIA

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Our work on Mentzelia section Trachyphytum (Loasaceae) has disclosed a number of new species and indicated the necessity for several nomenclatural changes. Some of these are presented here so that they may be included in our contribution of the Loasaceae in the new Manual of Southern California Botany being prepared by Philip Munz. In addition, some new chromosome numbers in Mentzelia are reported in the cited specimens. All chromosome analyses are from microsporocytes, and at least two individuals from each population were counted.

MENTZELIA CALIFORNICA Thompson & Roberts, sp. nov.

Herba erecta; folia rosulae irregulariter lobata lobis longis acutis, superiores ovato-lanceolatae; petala 5, lutea basi macula crocea, ovata, 6-11 mm longa; stamina 5-6 mm longa; stylus 5-6 mm longus; capsulae recurvae, 1.5-3.5 cm longae; semina irregulariter angulata, leviter tessellata, papillis rotundatis vel subacutis.

Plant erect, branching habit spreading, stems stout, 2-4 dm tall; leaves linear-lanceolate, rosette leaves irregularly lobed with long, pointed lobes, upper leaves ovate-lanceolate, fewer lobed or rarely entire; flowers solitary in the axils and terminal, opening in the morning; bracts entire, ovate-lanceolate, not white at base; calyx lobes 4-6 mm long, petals 5, 6-11 mm long, yellow with an orange spot at base, ovate, apex acute or rounded; stamens 5-6 mm long; style 5-6 mm long; capsules narrowed at the base, recurved to 180°, 1.5-3.5 cm long, about 1.5 mm wide; seeds irregularly angled, slightly tessellate, the surface with medium, rounded to slightly pointed papillae; n=27. Holotype: California, San Bernardino Co., 6.3 mi. south of Salt Wells, Thompson 1644 (US; isotype LA).

Mentzelia californica can occur in mixed colonies with M. albicaulis (n=36), M. veatchiana (n=27), M. mojaviensis (n=27), and M. obscura (n=18). This

1. Publications and collections prior to 1970 as Joyce Zavortink.

species hybridizes with M. mojavnensis, but the hybrids show reduced fertility with an average of 52% good pollen. Hybrids between M. californica and M. veatchiana are completely sterile. Mentzelia californica has usually been identified in herbaria as M. albicaulis and has not been recognized as a distinct species. Although it is similar to M. albicaulis, M. californica differs in having larger flowers, M. albicaulis has petals 2-6 mm long; longer styles, those of M. albicaulis are 3-5 mm long; much less pronounced papillae on the seed surface; ovate-lanceolate bracts, while M. albicaulis has bracts that are linear or lanceolate. Mentzelia californica is also somewhat similar to M. jonesii (n=18) but the two species do not occur together; M. californica has a more northern distribution while M. jonesii occurs in the more southern portions of the Mojave Desert, the Colorado Desert, and north along the Colorado River. Mentzelia californica is found on desert plains and roadside embankments with Larrea, Dalea, and Lycium, below 3000 ft., in the northern Mojave Desert, eastward into Nevada. Flowering period is March through April.

CALIFORNIA: Inyo Co., 1.1 mi. east of Salsbury Pass, Thompson 3164, chromosome voucher, n=27 (LA); 4.3 mi. east of Salsbury Pass, Thompson 3156, chromosome voucher, n=27 (LA); Homewood Canyon, Zavortink 2812, chromosome voucher, n=27 (LA); 1.2 mi. west of Salsbury Pass, Zavortink 2479, chromosome voucher, n=27 (LA); 1 mi. east of Salsbury Pass, Zavortink 2482, chromosome voucher, n=27 (LA). Kern Co., corner of Inyokern Rd. and Kay Ave., Zavortink 2475, chromosome voucher, n=27 (LA); Searles Station, Wheeler & Richardson in 1930 (LA). San Bernardino Co., 1.5 mi. south of Red Mt., Thompson 1601, chromosome voucher, n=27 (LA); along U.S. 395 at Red Mt. Road, Zavortink 2541, chromosome voucher, n=27 (LA). NEVADA: Lincoln Co., 1 mi. east of Panaca, Thompson 3277, chromosome voucher, n=27 (LA).

MENTZELIA DESERTORUM (Davidson) Thompson & Roberts, comb. nov.

Acrolasia desertorum Davidson. Bull. So. Calif. Acad. Sci. 5: 16. 1906. Holotype: Signal Mts., Colorado Desert near boundary, 30 Mar. 1901, T. G. Brandegee (LAM!; isotype UC!).

Mentzelia desertorum occurs on fine, sandy desert flats below 2000 ft. with Larrea, Encelia, and Abronia. It is common throughout the Sonoran Desert northward sporadically to extreme southern Inyo Co. It is very similar to M. obscura, described below,

and often occurs in mixed colonies with M. albicaulis (n=36) and M. obscura (n=18). Mentzelia desertorum can easily be distinguished from M. albicaulis by seed characters; M. obscura has smooth seeds, not tessellate, while seeds of M. albicaulis are very papillose and tessellate. When growing with M. obscura, it can most easily be differentiated by its very short, rounded leaf lobes, which are long and pointed in M. obscura. Also, where the two species grow together, M. obscura always has larger flowers than M. desertorum. We have counted eighteen populations and are here reporting the chromosome number as n=9. Voucher specimens are in the US and LA herbaria; representative specimens of which are:

CALIFORNIA: San Bernardino Co., 2.8 mi. west of Cronise Valley along U.S. 466-91, Thompson 3143, chromosome voucher, n=9 (LA). Riverside Co., along U.S. 60, 20.1 mi. east of Desert Center, Zavortink 2672, chromosome voucher, n=9 (LA); along the road to Willis Palms, 3.4 mi. east of U.S. 99, Thompson 3014, chromosome voucher, n=9 (LA). San Diego Co., just east of Ocotillo Wells, Raven 16891, chromosome voucher, n=9 (LA). Imperial Co., at Ogilby, Zavortink 2682, chromosome voucher, n=9 (LA). ARIZONA: Mohave Co., 5.2 mi. east of Topock along U.S. 66, Zavortink 2721, chromosome voucher, n=9 (LA).

MENTZELIA EREMOPHILA (Jepson) Thompson & Roberts, comb. nov.

Mentzelia lindleyi Torrey & Gray var. eremophila Jepson. Man. Fl. Pl. Calif. 650. 1925. Lectotype: Kern Co., Randsburg, Hall & Chandler 6880 (JEPS!). The type specimen cited by Jepson is "Hall & Chandler 6680", but this specimen is a Scirpus, not a Mentzelia. There is a Hall & Chandler 6880 from Randsburg which fits the description given by Jepson, and we are assuming the specimen number originally cited by Jepson is probably a typographical error.

Mentzelia eremophila is very common along canyon slopes of the eastern margins of Kern Co. and the northwestern corner of San Bernardino Co., in association with Larrea, Yucca brevifolia, and Dalea, mostly below 4000 ft. Although it has not previously been recognized as a distinct species, it is nonetheless readily distinguished from all other species of Mentzelia. It has large flowers with petals over 1.5 cm in length, a long style over 1 cm, and very deeply and sharply lobed leaves, which has caused it to be identified in many herbaria as M. lindleyi. However, its entire bracts and recurved capsules, together with its distinctive seeds (rounded with a pronounced hilum) are very different from the lobed

bracts and erect capsules of M. lindleyi. Also, M. lindleyi occurs only on serpentine slopes of Foothill Wd. communities, while M. eremophila is strictly a desert species. Chromosome numbers have been ascertained from eight populations, with voucher specimens in the US and LA herbaria, and the number is reported here as $n=9$. Representative specimens are:

CALIFORNIA: Kern Co., 5.7 mi. northeast of U.S. 6 on road to Randsburg, Thompson 1599, chromosome voucher, $n=9$ (LA); 1 mi. north of Atolia, Lewis in 1950, chromosome voucher, $n=9$ (LA); Last Chance Canyon, Zavortink 2652, chromosome voucher, $n=9$ (LA); Red Rock Canyon, Zavortink 2653, chromosome voucher, $n=9$ (LA); Mesquite Canyon, Zavortink 2656, $n=9$ (LA).

MENTZELIA JONESII (Urban & Gilg) Thompson & Roberts, comb. nov.

Mentzelia albicaulis (Hooker) Torrey & Gray var. jonesii Urban & Gilg. Nova Acta Akad. Leop.-Carol. 76: 29. 1900. Lectotype: Yucca, Arizona, Jones 3900 (POM!). Mentzelia albicaulis (Hooker) Torrey & Gray var. spectabilis Jones. Contr. West. Bot. 12: 16. 1908. No type cited with original description. Mentzelia nitens Greene var. jonesii (Urban & Gilg) Darlington. Ann. Missouri Bot. Gard. 21: 198. 1934. Mentzelia nitens Greene var. leptocaulis darlington. Ann. Missouri Bot. Gard. 21: 199. 1934. Type: Williams Fork, Arizona, Palmer 157 (M).

Mentzelia jonesii is found in rather coarse soil on desert plains and slopes with Larrea, Yucca brevifolia, Coleogyne, and Opuntia, often growing up through desert shrubs, below 4000 ft., from south-central Inyo Co. south throughout the Mojave Desert and eastward to southern Nevada and western Arizona along the Colorado River. This species often occurs in mixed populations with M. obscura ($n=18$) and M. albicaulis ($n=36$), but is easily distinguished by its larger flowers and longer styles; M. jonesii has petals longer than 8 mm, those of M. albicaulis and M. obscura are less than 8 mm; the styles of M. jonesii are 6-10 mm while those of M. albicaulis and M. obscura are 3-5 mm long. It differs from M. obscura also in that the seeds of M. obscura are smaller, not tessellate, and have small pointed papillae, while those of M. jonesii are tessellate and have moderately sized papillae. Chromosome numbers have been determined from eight populations and the number is reported here as $n=18$. Although artificial hybrids have been made in the laboratory between M. jonesii and M. obscura, also $n=18$, they

are sterile with less than 2% good pollen. Voucher specimens are in the US and LA herbaria; representative specimens are:

CALIFORNIA: Inyo Co., Sheppard Canyon, Zavortink 2800, chromosome voucher, $n=18$ (LA). San Bernardino Co., along the road to Excelsior Mine, 19.4 mi. north of Interstate 10, Zavortink 2776, chromosome voucher, $n=18$ (LA). ARIZONA: Mohave Co., 11.1 mi. south of Hoover Dam along U.S. 466-93, Thompson 3050, chromosome voucher, $n=18$ (LA).

MENTZELIA MOJAVENSIS Thompson & Roberts, sp. nov.

Herba erecta; folia rosulae rhache normale et lobis brevibus rotundatis, superiores late ovato-lanceolatae, lobata; bracteae late ovatae, integrae vel 3-5 lobatae, raro base macula dilute albidae; petala 5, 6-8 mm longa, lutea basi macula crocea, obovata vel ovata, apice acuto vel rotundato, raro retuse; stamina 4-5 mm longa; stylus 4-5 mm longus; capsulae erectae vel recurvae, 1.2-2.5 cm longae; semina parce tessellata, papillis aliquantum acutis.

Plant erect, the branching pattern moderately spreading, the stems stout, 2-4 dm tall; rosette leaves linear-lanceolate, medium in width, with short to medium, rounded lobes, upper leaves broadly ovate-lanceolate and rather sharply lobed, sometimes slightly clasping at base; flowers solitary in the axils and terminal, opening in the morning; bracts broadly ovate, entire or 3-5 lobed, rarely with a faint white area at base; calyx lobes 2-5 mm long; petals 5, 6-8 mm long, yellow with an orange spot at the base, obovate or broadly ovate, apex acute or rounded, rarely retuse; stamens 4-5 mm long; style 4-5 mm long; capsules narrowed at base, erect or recurved to 90°, 1.2-2.5 cm long, about 2-3 mm wide; seeds irregularly angled, slightly or moderately tessellate, the surface with somewhat pointed papillae; $n=27$. Holotype: California, Los Angeles Co., 15 mi. east of Lancaster on East Ave. J, Zavortink 2520, chromosome voucher, $n=27$ (US; isotype LA).

Mentzelia mojavisensis occurs on desert plains and roadside embankments along the western margins of the Mojave Desert in Los Angeles and Kern counties, below 3500 ft., with Larrea and Yucca brevifolia. It is often found in mixed populations with M. veatchiana ($n=27$), M. californica ($n=27$), M. obscura ($n=18$), and M. albicaulis ($n=36$). Hybrids between M. mojavisensis and M. californica do occur, although the hybrids show lessened pollen fertility of around 53% good pollen. Hybrids between M. mojavisensis and M.

veatchiana are completely sterile with less than 3% good pollen. Hybrids between M. californica and M. veatchiana produced in the laboratory are very similar morphologically to M. mojavenensis, and it is conceivable that M. mojavenensis has arisen from hybridization between M. californica and M. veatchiana. Hybrid swarms are very common where M. mojavenensis occurs with M. californica and M. veatchiana. Flowering period is March through April.

CALIFORNIA: Kern Co., 2.7 mi. west of U.S. 14 on the Walker Pass Road, Zavortink 2552, chromosome voucher, n=27 (LA); north of Rosamond, Zavortink 2555, chromosome voucher, n=27 (LA); 1 mi. west of Randsburg, Thompson 1727 (LA). Los Angeles Co., 1.2 mi. south of H1 Vista, Zavortink 2526, chromosome voucher, n=27 (LA); 3 mi. east of Palmdale, corner of Palmdale Blvd. and 40th St. E, Thompson 1596 (LA). San Bernardino Co., along U.S. 395 at Red Mountain, Zavortink 2543, chromosome voucher, n=27 (LA).

MENTZELIA OBSCURA Thompson & Roberts, sp. nov.

Herba ramosissima; folia rosulae lobis longis acutis, superiores ovata vel ovato-lanceolata, plerumque integra; bracteae ovatae integraeque; petala 5, 4-8 mm longa, lutea basi macula crocea, ovata vel obovata, apice acuto; stamina 3-6 mm longa; stylus 3-6 mm longus; capsulae recurvae, 1.3-3 cm longae; semina parva, rotundata, non tessellata, papillis parvis acutis.

Plant erect or spreading, many branched from base, often compact and rounded; rosette leaves linear-lanceolate with long, pointed lobes, irregularly lobed, the upper leaves ovate-lanceolate, usually entire; flowers solitary in the axils and terminal, opening in the morning; bracts entire, often appressed or cupped, ovate or ovate-lanceolate, not white at base; calyx lobes 2-5 mm long; petals 5, 4-8 mm long, yellow with an orange spot at base, ovate or occasionally obovate, the apex rounded or acute; stamens 3-6 mm long; style 3-6 mm long; capsules recurved to 180°, narrowed at base, 1.3-3 cm long, about 1.5 mm wide; seeds more or less rounded, light tan, not tessellate, the surface with very slight, pointed papillae; n=18. Holotype: California, Kern Co., 5.7 mi. northeast of U.S. 6 on road to Randsburg, Thompson 1600, chromosome voucher, n=18 (US; isotype LA).

Mentzelia obscura is widely distributed throughout the Mojave and Sonoran Deserts from northcentral

Inyo Co. south into Baja Calif., eastward into western Arizona and Nevada, locally in Utah, in disturbed areas along roadside embankments and desert plains with Larrea, Encelia, Yucca brevifolia, and Dalea. It commonly occurs in mixed populations with M. albicaulis (n=36), M. californica (n=27), M. veatchiana (n=27), M. mojaviensis (n=27), M. jonesii (n=18), M. desertorum (n=9), M. nitens (n=9) and M. eremophila (n=9). Hybrids between M. obscura and species of different ploidy level are very difficult to obtain even in the laboratory and are completely sterile. As previously mentioned, artificial hybrids between M. obscura and M. jonesii, also n=18, are also sterile, and no naturally occurring hybrids have ever been found. Flowering period late Feb. - April.

CALIFORNIA: Inyo Co., 2 mi. west of Panamint Springs, Thompson 3160, chromosome voucher, n=18 (LA); Mesquite Springs, Wiggins 11550 (RSA). Kern Co., 2.9 mi. east of China Lake, Thompson 1640, chromosome voucher, n=18 (LA); Last Chance Canyon, Zavortink 2651, chromosome voucher, n=18 (LA); Red Rock Canyon, Zavortink 2460, chromosome voucher, n=18 (LA). San Bernardino Co., Sheephole Summit, Raven 11875, chromosome voucher, n=18 (LA); 2.8 mi. west of Cronese Valley, Thompson 3138, chromosome voucher, n=18 (LA); 1.8 mi. south of Ivanpah, Zavortink 2475, chromosome voucher, n=18 (LA); 12.7 mi. east of Yermo on road to Mt. Afton, Zavortink 2468, chromosome voucher, n=18 (LA). Riverside Co., Fried Liver Wash, Joshua Tree National Monument, Zavortink 2458, chromosome voucher, n=18 (LA); Corn Spring, Zavortink 2457, chromosome voucher, n=18 (LA). Imperial Co., along Rt. 78, 8.3 mi. south of the county line, Zavortink 2676, chromosome voucher, n=18 (LA). NEVADA: Nye Co., Frenchman Flat, Raven 18881, chromosome voucher, n=18 (LA). Clark Co., 13.1 mi. northwest of Indian Springs on road to Lathrop, Raven 12049, chromosome voucher, n=18 (LA). UTAH: Tooele Co., Wendover, Mosquin 4332, chromosome voucher, n=18 (LA). ARIZONA: Mohave Co., Willow Wash near Yucca, Zavortink 2727, chromosome voucher, n=18 (LA); 5.8 mi. south of Hoover Dam, Thompson 3032, chromosome voucher, n=18 (LA). Yuma Co., just south of Parker Dam, Zavortink 2715, chromosome voucher, n=18 (LA). MEXICO: Baja California, 15.5 mi. south of San Luis Gonzaga, Daniels 39, chromosome voucher, n=18 (LA).

MENTZELIA RAVENII Thompson & Roberts, sp. nov.

Herba erecta, ramis e basi pluribus; folia rosulae lobis brevibus rotundatis, rhache lata;

bracteae late 3-5 lobatae basi albidae, appressae; petala 5, lutea basi macula crocea, obovata, apice retuso, 5-10 mm longa; stamina 3-7 mm longa; stylus 4-7 mm longus; capsulae erectae, 1.4-2.3 cm longae; semina irregulariter angulata, parce tessellata, papillis rotundatis.

Plant erect, branching pattern spreading, stems stout, several branched from base, 2-4 dm tall; rosette leaves linear-lanceolate but broad, with short rounded lobes, upper leaves more ovate-lanceolate with fewer, sharp pointed lobes, broad at base; flowers solitary in the axils and terminal, opening in the morning; bracts broadly 3-5 lobed with a white area at the base, usually broader than long; petals 5, 5-10 mm long, yellow with an orange spot at base, obovate, the apex retuse; stamens 3-7 mm long; style 4-7 mm long; capsules erect, narrowed at base, 0.9-2.3 cm long, about 3 mm wide; seeds irregularly angled, slightly to moderately tessellate, the surface with rounded papillae; $n=18$. Holotype: California, Los Angeles Co., San Gabriel Mts., 4.3 mi. south of Pearblossom, Raven 11959 (US). This species has been named in honor of Professor Peter H. Raven, Stanford University, in recognition of his many collections of specimens and cytological material of Trachyphytum species in general and his collections of this species in particular which have aided the authors in determining the species limits.

Mentzelia ravenii occurs along roadside embankments and canyon slopes associated with Larrea and Yucca brevifolia, in desert margin areas in Los Angeles County and western Riverside County. This species is rare both in nature and in herbaria. Most herbaria specimens have been variously referred to M. gracilenta, M. veatchiana, or M. montana. Mentzelia ravenii occurs commonly with M. veatchiana ($n=27$) and though similar to the latter species, can be differentiated on the basis of the following; M. ravenii has yellow petals while the desert populations of M. veatchiana are usually deep orange; M. ravenii has a spreading branching habit in contrast to the strict pattern of M. veatchiana; the bracts of M. ravenii are much broader and often somewhat clasping, while those of M. veatchiana are narrow and not clasping. Flowering period is March through April.

CALIFORNIA: Los Angeles Co., 3.9 mi. southeast of Pearblossom on road to Valyermo, Thompson 3044, chromosome voucher, $n=18$ (LA); Big Rock Creek Road to Los Angeles County Playground, Craig 1039 (UC); along the Pearblossom Road near marker #2.87,

Zavortink 2446, chromosome voucher, $n=18$ (LA); 1 mi. south of Pearblossom on road to Little Rock Dam, Zavortink 2445, chromosome voucher, $n=18$ (LA); Soledad Canyon, Zavortink 2558, chromosome voucher, $n=18$ (LA). Riverside Co., 3.8 mi. north of Alberhill, Thompson 1613, chromosome voucher, $n=18$ (LA).

MENTZELIA TRIDENTATA (Davidson) Thompson & Roberts, comb. nov.

Acrolasia tridentata Davidson. Bull. So. Calif. 9: 71. 1910. Type: California, Inyo Co., banks of Haiwee Reservoir, Hasse & Davidson 2460, Apr. 26, 1910 (LAM!). Mentzelia tricusps Gray var. brevicornuta Johnston. Univ. Calif. Publ. Bot. 7: 444. 1922. Type: T. S. Brandegees, Barstow, California, May 14, 1903 (UC).

Acrolasia tridentata Davidson has been recognized by previous monographers (as in Darlington, 1934) as a synonym of M. tricusps var. brevicornuta Johnston, and identified in herbaria as this species or as M. involucrata. Mentzelia tridentata differs from M. involucrata in that it does not have white bracts, and in that respect it is similar to M. tricusps. However, the lateral cusps of the stamens are much shorter than the central cusp in M. tridentata, while the lateral cusps are longer than the central cusp in M. tricusps. The seeds of M. tridentata are more similar to those of M. involucrata than they are to M. tricusps; they are rounded and broadest at the middle, constricted on both faces above and below the middle, while the seeds of M. tricusps are ovate, broadest at the top, and constricted at the middle. The plants of M. tridentata are usually much smaller in general than M. tricusps, less than 1 dm. Mentzelia tridentata is quite restricted in range to buttes around the Barstow-Daggett area of San Bernardino County and the type locality in Inyo County. Flowering period is March through April. The chromosome number has been determined for several individuals from one population and is reported here as $n=10$. CALIFORNIA: San Bernardino Co., buttes north of Daggett, Thompson 3566, chromosome voucher, $n=10$ (LA).

MENTZELIA TRICUSPIS Gray. Chromosome number for this species is reported here also for the first time as $n=10$.

CALIFORNIA: San Bernardino Co., 1 mi. west of Havasu Landing, Thompson 3590, chromosome voucher, $n=10$ (LA). NEVADA: Clark Co., along Lone Mt. road,

5.3 mi. west of U.S. 95, Thompson 3573, chromosome voucher, $n=10$ (LA).

MENTZELIA REFLEXA Coville. Chromosome number is also reported here for the first time as $n=10$.

CALIFORNIA: Inyo Co., Death Valley north of Furnace Creek, Thompson 3157, chromosome voucher, $n=10$ (LA); Panamint Springs, Thompson 3161, chromosome voucher, $n=10$ (LA).

References Cited

Darlington, Josephine. 1934. Ann. Missouri Bot. Gard. 21: 204. 1934.

PHYTOLOGIA

Designed to expedite botanical publication

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June, 1971

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
or \$8, at close of volume

A REVISED CLASSIFICATION FOR THE ORDERS
AND FAMILIES OF MOSSES

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The present paper is partly in response to many requests by non-bryologists for a listing of higher categories of mosses, but also, it seems advantageous to have a listing that can be used in conjunction with the recent list of orders and families of hepaticae by Schuster (1966). Thus, I take the opportunity to provide the following version that incorporates some recent evolutionary evidence and some personal opinion.

The general history of moss classification is given by Dixon (1932) and there are some more recent comments by Schaffner (1938) and Steere (1958). The history shows the early use of three orders, Sphagnales, Andreaeales and Bryales. Later, additional orders were recognized by Fleischer, Brotherus and Dixon and in the last author's work the Bryales were divided into Tetraphidales, Calomniales, Schistostegales, Buxbauminiales, Polytrichales, Fissidentales, Grimmiiales, Dicranales, Syrrhodontales, Pottiales, Encalyptales, Orthotrichales, Funariales, Eubryales, Isobryales, Hookeriales, and Hypnobryales. My own views fall between these extremes and are rather conservative.

Regarding the higher categories, I recognize a single Division, Bryophyta, which I consider a natural group. Aside from the lack of vascular tissue, I would distinguish this natural group by the unbranched sporophyte which I consider to be derived from branched sporophytes of a non-bryophyte ancestor. For the basic subdivision between the hepatics and the mosses I recognize two prime characters, (1) the elongation in the base of the apically mature sporophyte in the former group versus the strictly apical growth in the latter, and (2) the tendency for fusion in gametophyte tissues (perianths, leaves, etc.) in the former versus strict separation of vegetative parts in the latter.

At lower levels of classification I accept Sphagnum and its fossil relatives as distinct at the subclass level. The most useful distinction of the group seems to be the difference in the ultimate divisions of the leaf cells. The five orders I recognize in the subclass Bryidae reflect a reduction in the comparative status of the Andreaeales which I do not consider more distinct than the Tetraphidales. These two orders I view as rather primitive, and the fact that they and Sphagnum all have thalloid or other non-filamentous aspects to their protonemata seems significant. What has been called Bryales I recog-

nize as four orders. The previous major subdivisions of the Bryales compare as follows: Nematodontae becoming two orders, Tetraphidales and Polytrichales, and Arthrodontae becoming two orders, Dicranales (=Haplolepidaceae) and Bryales (=Diplolepidaceae). In this arrangement I would place the Polytrichales much closer to the Dicranales and there is no one character that will distinguish all the genera of these two orders. I find the peristome of the Polytrichaceae to be completely different in origin from that of other mosses and probably a more recent development. The Dawsoniaceae which are in the same order retain a peristome of a more primitive type.

At the family level I have adopted some changes proposed by Andrews for the Leucobryaceae (1947) and Rhytidiaceae (1954). I retain the Leptostomataceae which Andrews (1951) placed in the Bryaceae. The following arrangement of the families allows for certain similarities that may or may not indicate relationships. I have placed the Schistostegaceae with the Mitteniaceae on the basis of observations of the protonemata of *Mittenia* by Stone (1961, 1962). Two personal opinions are represented in my placement of the Fissidentaceae and the Hookeriaceae. As I intend to indicate elsewhere, I regard the leaf form of the Fissidentaceae as the product of a rather simple evolutionary process, and I place the family close to the Dicranaceae. I place the Hookeriaceae with other families, many members of which share such characters as a median furrow on the outer surface of the peristome, short or double costae, and almost undifferentiated alar cells. This Hookeroid-Hypnoid complex I consider quite distinct from either the strongly costate Leskeoid-Brachythecoid complex or the Pterobryoid-Neckeroid complex that often shows preperistome development.

Division Bryophyta

Class Bryatae

Subclass Sphagnidae

Order Protosphagnales

Family Protosphagnaceae (fossil)

Family Intiaceae (fossil)

Order Sphagnales

Family Sphagnaceae

Subclass Bryidae

Order Andreaeales

Family Andreaeaceae

Order Tetraphidales

Family Tetraphidaceae (=Georgiaceae)

Order Polytrichales

Family Polytrichaceae

Family Dawsoniaceae

Order Dicranales

Family Archidiaceae

Family Ditrichaceae

Family Bryoxiphiaceae
Family Seligeriaceae
Family Grimmiaceae (including Ptychomitriaceae)
Family Fissidentaceae (including Archifissidentaceae)
Family Dicranaceae (including part of Leucobryaceae)
Family Dicnemonaceae
Family Pleurophascaceae
Family Calymperaceae (including part of Leucobryaceae)
Family Pottiaceae (including Trichostomaceae,
Cinclidotaceae, Splachnobryum)

Family Bryobartramiaceae

Family Encalyptaceae

Family Buxbaumiaceae

Family Diphysciaceae

Order Bryales

Family Rhacithecaceae

Family Erpodiaceae

Family Helicophyllaceae

Family Orthotrichaceae

Family Gigaspermaceae

Family Disceliaceae

Family Ephemeraceae

Family Funariaceae

Family Splachnaceae

Family Schistostegaceae

Family Mitteniaceae

Family Drepanophyllaceae

Family Calomniaceae

Family Eustichiaceae

Family Sorapillaceae

Family Timmiaceae

Family Bryaceae

Family Leptostomataceae

Family Mniaceae

Family Aulacomniaceae

Family Meeseaceae

Family Catosciaceae

Family Bartramiaceae

Family Rhizogoniaceae

Family Spiridentaceae

Family Hypnodendraceae

Family Hypopterygiaceae

Family Rhacopilaceae

Family Fontinalaceae

Family Wardiaceae

Family Hedwigiaceae

Family Cryphaeaceae

Family Leucodontaceae

Family Cyrtopodaceae

Family Prionodontaceae

Family Lepyrodontaceae

Family Rutenbergiaceae

Family Trachypodaceae

Family Myuriaceae

Family Pterobryaceae

Family Meteoriaceae

Family Phyllogoniaceae

Family Neckeraceae

Family Lembophyllaceae

Family Climaciaceae

Family Pleuroziopsidaceae

Family Echinodiaceae

Family Fabroniaceae

Family Leskeaceae (including Theliaceae, Thuidiaceae)

Family Amblystegiaceae

Family Brachytheciaceae (including Rigodium)

Family Entodontaceae

Family Plagiotheciaceae

Family Ephemeropsidaceae (=Nemataceae)

Family Hookeriaceae (including Pilotrichaceae)

Family Ptychomniaceae

Family Symphyodontaceae

Family Leucomiaceae

Family Sematophyllaceae

Family Hypnaceae (including Rhytidiaceae)

Family Hylocomiaceae

Family Hydropogonaceae

Literature Cited

Andrews, A. Leroy 1947. Taxonomic notes VI. The Leucobryaceae.
The Bryologist 50: 319-326.

_____. 1951. Taxonomic notes X. The family Leptostomaceae.
The Bryologist 54: 217-223.

- Andrews, A. Leroy 1954. Taxonomic notes XII. The families Rhytidiaceae and Hylocomiaceae. The Bryologist 57: 251-261.
- Dixon, H. N. 1932. Chapter XIV. Classification of mosses. 397-412. in Fr. Verdoorn ed. Manual of Bryology. 486 pp. Martius Nijhoff, The Hague.
- Schaffner, J. H. 1938. The natural orders of the true mosses. The Bryologist 41: 57-63.
- Schuster, R. M. 1966. The Hepaticae and Anthocerotae of North America—East of the Hundredth Meridian. Vol. 1. 822 pp. Columbia University Press, New York.
- Steere, W. C. 1958. Evolution and speciation in mosses. The Amer. Natur. 92: 5-20.
- Stone, Ilma G. 1961. The gametophyte and sporophyte of Mittenia plumula (Mitt.) Lindb. Aust. Journ. of Bot. 9(2): 124-151, pl. 1-4.
- . 1962. The highly refractive protonema of Mittenia plumula (Mitt.) Lindb. (Mitteniaceae). Proc. Roy. Soc. Vict. 74: 119-124.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XXXVI.

A NEW GENUS, NEOBARTLETTIA.

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Among the Critonioid genera of the Eupatorieae, there are three that are notable for often having hairs on the surface of the receptacle. Two of these, Hebeclinium (King & Robinson, 1971) and Decachaeta (King & Robinson, 1969) have been recognized in part since Decandolle (1836). The third genus, Neobartlettia, occurring primarily in the lowlands of Central America, is named as new here.

The new genus shows a number of trends which help in the recognition of most of the species. These include the usually long slender petioles of the leaves, the usually numerous hairs on the backs of the corolla lobes, the usually more papillose style branches, and the usually slender inornate anther collars. The characters that prove most diagnostic in the accurate delimitation of the genus are the full sized anther appendages without recurved margins, the convex or short conical receptacle, the short broad lobes of the corolla and the distinctive slightly swollen carpopodium. Though the carpopodia show differences between the various species, there is a basic uniformity of design. In its most frequent form the lower tapering part is made up of shorter rather thin-walled, sometimes enlarged cells which are only slightly differentiated from the upper more elongate cells, and the upper cells form a swollen area around the base of the achene and upward along the bases of the ribs. In a few species such as N. ehrenbergii, N. pinabetensis and N. paezense the carpopodium is a narrower rim but with cells still not differentiated from those at the bases of the ribs.

Neobartlettia proves to include most of the species that have been placed in the genus Hebeclinium during the second half of the 19th century. The genera are rather closely related though they can be told very easily by the shape of the receptacle. The receptacle of Hebeclinium is distinctly hemispherical.

We have placed another group of related species in a separate genus, Guayania. This latter genus is distinguished primarily by its very asymmetric carpopodia and its usually cymose inflorescences.

Neobartlettia R.M.King and H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae frutescentes vel subarborescentes laxae ramosae. Folia opposita plerumque longe petiolata, laminis ellipticis vel late ovatis. Inflorescentiae plerumque laxae

corymbosae. Involucri squamae 20-50 inaequilongae 3-4-seriatae anguste lanceolatae vel oblongae; receptacula plana vel convexa pauce vel dense pubescentia. Flores 20-150 in capitulo, corollae violaceae vel albae infundibulares, cellulis plerumque angustis, parietibus sinuosis, lobis aequalateraliter triangularibus, intus glabris extus plerumque dense setiferis saepe glanduliferis; filamenta antherarum in parte superiore longissima, cellulis quadratis vel rectangularibus, parietibus inornatis, cellulis exothecialibus plerumque subquadratis vel brevioribus, appendicibus antherarum longe triangularibus vel late ovatis; styli inferne non-nodulosi glabri, appendicibus tenuibus vel anguste clavatis sublaevibus vel breviter papillois; achaenia prismatica 5-costata glabra vel pauce setifera raro glandulifera, costae in parte inferiore et carpopodia pauce vel valde inflata, cellulis carpopodiorum inferne quadratis superne elongatis, parietibus tenuibus; pappus setiformi uniseriatus, setis 30-40 gracilibus scabris persistentibus, cellulis apicalibus acutis.

Species typica: Eupatorium tuerckheimii Klatt.

Chromosome number determined as $2n = 20$ (Holmgren, 1919; N. sordida, reported as Eupatorium ianthinum).

We take great pleasure in naming this new genus of very showy plants in honor of Harley Harris Bartlett. The senior author was fortunate to have known this great botanist personally for a brief period. The life and works of Bartlett have been summarized by Voss (1961).

Our studies indicate that the genus contains the following nineteen species.

Neobartlettia brevipetiolata (Schultz-Bip. ex Klatt) R.M.King & H.Robinson, comb. nov. Hebeclinium brevipetiolatum Schultz-Bip. ex Klatt, Leopoldina 20: 90. 1884. Mexico.

Neobartlettia constipatiflora (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium constipatiflorum Klatt, Ann. Naturh. Hofmus. Wien 9: 355. 1894. Mexico.

Neobartlettia ehrenbergii (Hemsl.) R.M.King & H.Robinson, comb. nov. Eupatorium ehrenbergii Hemsl., Biol. Centr. Am. Bot. 2: 94. 1881. Guatemala, Mexico.

Neobartlettia hastifera (Standl. & Steyererm.) R.M.King & H.Robinson, comb. nov. Eupatorium hastiferum Standl. & Steyererm., Field Mus. Publ. Bot. 22: 303. 1940. Guatemala.

Neobartlettia hylobia (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium hylobium B.L.Robinson, Proc. Bost. Soc. Nat. Hist. 31: 249. 1904. Mexico.

- Neobartlettia karwinskiana (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium karwinskianum A.P.Decandolle, Prodr. 5: 163. 1836. Mexico.
- Neobartlettia luxii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium luxii B.L.Robinson, Proc. Amer. Acad. 36: 480. 1901. Guatemala.
- Neobartlettia maxonii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium maxonii B.L.Robinson, Proc. Amer. Acad. 54: 251. 1918. Panama.
- Neobartlettia mexiae (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium mexiae B.L.Robinson, Contr. Gray Herb. 104: 20. 1934. Brazil.
- Neobartlettia oresbia (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium oresbium B.L.Robinson, Proc. Amer. Acad. 35: 337. 1900. Mexico.
- Neobartlettia oresbioides (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium oresbioides B.L.Robinson, Proc. Amer. Acad. 44: 618. 1909. Guatemala, Mexico.
- Neobartlettia paezense (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium paezense Hieron., Engl. Bot. Jahrb. 28: 574. 1901. Colombia.
- Neobartlettia pansamalensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium pansamalense B.L.Robinson, Proc. Amer. Acad. 36: 482. 1901. Guatemala, Mexico.
- Neobartlettia pinabetensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium pinabetense B.L.Robinson, Proc. Amer. Acad. 36: 482. 1901. Guatemala, Mexico.
- Neobartlettia platyphylla (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium platyphyllum B.L.Robinson, Proc. Amer. Acad. 35: 339. 1900. Costa Rica, Guatemala, Mexico, Panama.
- Neobartlettia prionophylla (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium prionophyllum B.L.Robinson, Proc. Amer. Acad. 36: 484. 1901. Costa Rica, Guatemala.
- Neobartlettia ruae (Standl.) R.M.King & H.Robinson, comb. nov. Eupatorium ruae Standl., Ceiba 1: 49. 1950. Honduras.
- Neobartlettia sordida (Less.) R.M.King & H.Robinson, comb. nov. Eupatorium sordidum Less., Linnaea 4: 403. 1831. Mexico.

Neobartlettia tuerckheimii (Klatt) R.M.King & H.Robinson, comb.
nov. Eupatorium tuerckheimii Klatt, Leopoldina 20: 95. 1884.
Guatemala, Honduras, Mexico.

Acknowledgement

This study was supported in part by the National Science Foundation Grant - 20502 to the senior author.

References

- Decandolle, A.P. 1836. Ordo. CII. Compositae. Prodr. Syst. Nat. 5: 4-695.
- Holmgren, J. 1919. K. Svenska Vetensk.-Akad. Handl. 59, No. 7.
- King, R.M. & H.Robinson 1969. Studies in the Eupatorieae (Compositae). XVI. A monograph of the genus Decachaeta DC. Brittonia 21: 275-284, 397.
- _____ and _____. 1971. Studies in the Eupatorieae (Asteraceae). XXXVII. The genus Hebeclinium. Phytologia 21: 298-301.
- Voss, E.G. 1961. Harley Harris Bartlett. Bull. Torrey Bot. Club 88(1): 47-56.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XXXVII.

THE GENUS HEBECLINIUM

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The Eupatorian species with hair or chaff on the receptacles have often been segregated into a separate genus or section, Hebeclinium. Like many other segregates previously recognized in the Eupatorieae, this concept of Hebeclinium is somewhat artificial. Some species such as Polyanthina nemorosa (1970) and Urolepis hecatantha (1971) have no close relationship. Also, hairs are found occasionally on receptacles of many species in such genera as Fleischmannia and Critonia. Still, most species of Eupatorieae with prominent hairs on the receptacles belong to a related group of three genera, Decachaeta (1969), Hebeclinium, and Neobartlettia (1971).

This related group of three genera may be considered Critonioid in the broad sense having smooth surfaced corolla lobes and simple style bases. The three genera are rather distinct, however, in having usually slender anther collars with mostly inornate cells, and usually having many distinct hairs on the outer surfaces of the corolla lobes. Decachaeta is distinct by the short anther appendages with recurved margins, and all but one species of Decachaeta have alternate leaves. Decachaeta is entirely Mexican and Central American in distribution. Neobartlettia is most obviously distinct from Hebeclinium in its less convex, conical or even flat receptacles. Neobartlettia occurs primarily in Mexico and Central America with some South American species.

In seeking a more concise understanding of Hebeclinium and its relatives, we have taken vertical sections through the receptacles of a number of species. In almost all the species of Hebeclinium the very highly convex receptacle is composed internally almost entirely of sclereids. The massive outer layer is many cells thick and breaks off rather easily. Only one species, H. guevarae, has been seen with considerable parenchyma in the receptacle and the outer layer of sclereids only one or two cells thick. The receptacles of both Decachaeta and Neobartlettia characteristically have a large core of parenchyma.

Hebeclinium A.P. Decandolle, Prodr. 5: 136. 1836.

Plants erect, sparsely branched, herbs or subshrubs. Leaves always opposite, distinctly petioled, blades broadly ovate to deltoid, often serrate. Inflorescence a corymbose panicle. In-

volucre of 25-40 lanceolate phyllaries; in 3-5 series; receptacle hemispherical, barely to densely hairy; 20-80 flowers per head; corollas narrowly tubular, 5-lobed, outer surface of corolla glabrous below, lobes usually longer than wide, usually with prominent multicellular uniseriate hairs and a few glands; inner surface of four species with numerous multiseptate hairs; stomates absent; anther collar often slender composed of rather thin walled inornate cells, many quadrate cells in lower part. Anther appendage rather large with large cells; style base without enlarged node, glabrous. Styler appendage very narrow throughout, only slightly mamilllose. Achenes prismatic, 4-5 ribbed, setae sometimes present, carpodia scarcely distinct, only a few rows of short cells at edge, area of longer upper cells merging with sides of achene and extending up ribs, pappus of ca 30-40 scabrous setae, apical cells pointed. Chromosome number determined as $X = 10$ (Powell and King, 1969).

Type species: Eupatorium macrophyllum L.

Our studies indicate that the genus contains the following eleven species.

Hebeclinium bullatissimum (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium bullatissimum B.L.Robinson, Contr. Gray Herb. n.s. 73:6. 1924. Ecuador.

Hebeclinium cuatrecasasii (R.M.King & H.Robinson) R.M.King & H. Robinson, comb. nov. Eupatorium cuatrecasasii R.M.King & H.Robinson, Sida 3: 324. 1969. Colombia.

Hebeclinium erioclinium (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium erioclinium B.L.Robinson, Proc. Amer. Acad. 54: 243. 1918. Colombia.

Hebeclinium guapulense (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium guapulense Klatt, Leopoldina 20: 90. 1884. Colombia, Ecuador.

Hebeclinium guevarae (R.M.King & H.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium guevarae R.M.King & H.Robinson, Sida 3: 322. 1969. Colombia.

Hebeclinium hygrophylaeum (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium hygrophylaeum B.L.Robinson, Contr. Gray Herb. n.s. 17: 19. 1926. Costa Rica.

Hebeclinium jajoense (Aristeguieta) R.M.King & H.Robinson, comb. nov. Eupatorium jajoense Aristeguieta, Fl. Venez. 10: 200. 1964. Venezuela.

Hebeclinium macrophyllum (L.) A.P.Decandolle, Prodr. 5: 136.
1836. Eupatorium macrophyllum L. Sp. Pl. ed. 2, 1175. 1763.
Mexico, Central America, West Indies, South America (Colombia-Argentina).

Hebeclinium phoenicticum (B.L.Robinson) R.M.King & H.Robinson,
comb. nov. Eupatorium phoenicticum B.L.Robinson, Contr.
Gray Herb. n.s. 60: 26. 1919. Colombia.

Hebeclinium sericeum (H.B.K.) R.M.King & H.Robinson, comb. nov.
Eupatorium sericeum H.B.K., Nov. Gen. et Sp. 4: 110. ed.
fol. 1818. Colombia.

Hebeclinium torondoyense (Badillo) R.M.King & H.Robinson, comb.
nov. Eupatorium torondoyense Badillo, Bol. Soc. Venez.
Cienc. Nat. 9: 189. 1944. Colombia, Venezeula.

Species excluded

H. atrorubens Lem. = Neobartlettia sordida

H. brevipetiolata Schultz-Bip. ex Klatt =
Neobartlettia brevipetiolata

H. ehrenbergii Schultz-Bip. ex Hemsl. = Neobartlettia ehrenbergii

H. hecatanthum A.P.Decandolle = Urolepis hecatantha

H. ianthinum Hook. = Neobartlettia sordida

H. liebmanniae Schultz-Bip. ex Hemsl. = Decachaeta perornata

H. macrocephalum Benth. = Neobartlettia ehrenbergii

H. megalophyllum Lem. = Neobartlettia ?

H. panamense Carr. = Neobartlettia sordida

H. sordidum Schultz-Bip. ex Koster = Neobartlettia sordida

H. tepicanum Hook. & Arn. = Critonia hebebotrya

H. tetragonum Benth. = Fleischmannia microstemon

H. urolepis A.P.Decandolle = Urolepis hecatantha

H. vitifolium Schultz-Bip. ex Klatt = Eupatoriastrium triangulare

Note on the genus Decachaeta. The following species is to be added to those in the recent monograph of the genus (King & Robinson, 1969). The species is similar to D. thieleana but is distinct by its opposite leaves and less numerous glands.

Decachaeta perornata (Klatt) R.M.King & H.Robinson, comb. nov.
Eupatorium perornatum Klatt, Leopoldina 20: 90. 1884.
Mexico.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB - 20502 to the senior author.

References

- King, R.M. & H.Robinson 1969. Studies in the Eupatorieae (Compositae). XVI. A monograph of the genus Decachaeta DC. Brittonia 21: 275-284, 397.
- _____ & _____ 1970. Studies in the Eupatorieae (Compositae). XXXI. A new genus Polyanthina. Phytologia 20: 213-214.
- _____ & _____ 1971. Studies in the Eupatorieae (Asteraceae). XXXVI. A new genus Neobartlettia. Phytologia 21: 294-297.
- _____ & _____ 1971. Studies in the Eupatorieae (Asteraceae). XL. A new genus Urolepis. Phytologia 21: 304-305.
- Powell, A.M. & R.M.King 1969. Chromosome numbers in the Compositae. Colombian species. Amer. J. Bot. 56(1): 116-121.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XXXIX.

A NEW GENUS, GUAYANIA.

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The present new genus is established for four species of the Guayana Highland Region that appear very different from each other vegetatively, but which show great uniformity in most other characters. The convex to conical receptacles, corolla lobes densely hairy outside, anther collars slender with inornate cells, style branches with distinct short papillae and the style bases being plain, mark the group as related to Neobartlettia (King & Robinson, 1971). The four species treated here are distinguished from Neobartlettia by their very asymmetrical carpodia which have their foramens completely to one side. The species of Guayania have fewer flowers per head than most species of Neobartlettia, but some of the latter genus such as N. hastifera (Standl. & Steyererm.) R.M.King & H.Robinson, fall within the range. A distinguishing character for at least two species of Guayania is the distinctly cymose inflorescence. The inflorescence of a third species, G. penninervata, has been described as a panicle (Wurdack, 1953) and the underdeveloped specimen we have seen shows only tendencies to be cymose. The fourth species, G. yaviana, is described as densely corymbose and we have not seen any material.

The type species, G. roupalifolia, is widely distributed on the tepuis of the eastern and central Guayana Highlands Region and has very distinctive elliptical to obovate leaves with bluntly acute apices and tapering bases. This species has been considered closely related to G. yaviana which is also from higher elevations in the central highlands. Still, relationship to G. cerasifolia of lower elevations to the west seems as close. Guayania penninervata, also of lower elevations, is not known from enough collections for careful evaluation.

The new genus is the only one in the Eupatorieae that is endemic to or centered in the Guayana Highlands.

Guayania R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae frutescentes laxae ramosae. Folia opposita breve vel longe petiolata, laminis ellipticis vel late ovatis valde penninervatis herbaceis. Inflorescentiae aliquantum vel valde cymosae. Involucris squamae 12-25 inaequilongae 3-4-seriatae lanceolatae vel oblongae; receptacula conica glabra. Flores 5-25 in capitulo; corollae violaceae vel albae infundibulares, cellulis plerumque angustis, parietibus sinu-

osis, lobis aequilateraliter triangularibus intus glabris extus dense setiferis non-glanduliferis; filamenta antherarum in parte superiore longissima, cellulis quadratis vel rectangularibus, parietibus inornatis, cellulis exothecialibus plerumque subquadratis vel brevioribus, appendicibus antherarum longe triangularibus vel late ovatis; styli inferne non-nodulosi glabri, appendicibus tenuibus breviter papillosis; achaenia prismatica 5-costata pauce setifera; carpodia valde asymmetrica, cellulis inferne quadratis superne elongatis, parietibus tenuibus; pappus setiformi uniseriatus, setis 30-40 gracilibus scabris persistentibus, cellulis apicalibus acutis.

Species typica: Eupatorium roupalifolium B.L.Robinson.

Our studies indicate that the genus contains the following four species.

Guayania cerasifolia (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium cerasifolium Schultz-Bip. ex Baker, Mart. Fl. Bras. 6(2): 308. 1876. Brazil, Colombia, Venezuela.

Guayania penninervata (Wurdack) R.M.King & H.Robinson, comb. nov. Eupatorium penninervatum Wurdack, Mem. N.Y. Bot. Gard. 8(2): 145. 1953. Venezuela.

Guayania roupalifolia (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium roupalifolium B.L.Robinson, Proc. Am. Acad. 55: 30. 1919. Eupatorium tepuiarum Steyererm., Fieldiana, Bot. 28: 638. 1953. British Guiana, Venezuela.

Guayania yaviana (Lasser & Maguire) R.M.King & H.Robinson, comb. nov. Eupatorium yavianum (Lasser & Maguire) Lasser & Maguire, Bol. Soc. Venez. Cienc. Nat. 15: 106. 1954. Eupatorium angulicaule Lasser & Maguire, Brittonia 7: 88. 1950, non Eupatorium angulicaule Schultz-Bip. ex Baker. Venezuela.

Acknowledgement

This study was supported in part by the National Science Foundation Grant - 20502 to the senior author.

Reference

King, R.M. & H.Robinson 1971. Studies in the Eupatorieae (Asteraceae). XXXVI. A new genus, Neobartlettia. Phytologia

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XL.

THE GENUS, UROLEPIS.

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The name Urolepis is here raised to generic rank to accommodate the single species, U. hecatantha. The most distinctive feature of the genus is the greatly enlarged pubescent receptacle. Nearly as distinctive are the stylar appendages with long densely imbricate papillae. The carpopodium with its enlarged thin-walled cells and swollen upper part is also useful as a character, along with the enlarged blunt tipped apical cells of the pappus setae. The combination of characters given is more than adequate to set this genus apart from others.

The genus, Urolepis, is not easily placed among others in the Eupatorieae. The glabrous unenlarged style base and smooth corolla lobes might be Critonioid but the style branches and highly annulated anther collars would be unusual for that group. The species has been placed in Hebeclinium which is a Critonioid genus, but the latter has a smaller receptacle, cells of the anther collars without annular thickenings, corolla lobes with hairs on the back, style branches smooth, and pappus setae completely different. The style branches of Urolepis are like those of Ayapana and the numerous flowers on a hairy receptacle are reminiscent of the Ayapana related Polyanthina. Nevertheless, these Camploclinioid genera have enlarged style bases and very distinct carpopodia and do not seem closely related. The closest relatives of Urolepis are undoubtedly among the as yet unassigned species of southern Brazil and adjacent areas. A species placed in section Urolepis by Baker, Eupatorium trichobasis has a prominent pubescent receptacle, annulated anther collars, and the same type of enlarged blunt apical cells on the pappus setae. The achene is also rather similar but the carpopodium much less distinct. This latter species is very different, however, in the papillose inner surfaces and margins of the corolla lobes and the shorter more erect papillae of the style branches, and the relationships seem distinctly Gyptoid. It hardly seems necessary to indicate that the genus Eupatorium is only remotely related being distinguished by hairs on the base of the style among other things. It is only the crudest kind of taxonomy that Urolepis has resided under the name Eupatorium for so long.

Urolepis (A.P.Decandolle) R.M.King H.Robinson, new status.
Hebeclinium section Urolepis A.P.Decandolle, Prodr. 5: 136.
1836.

Eupatorium section Urolepis [A.P.Decandolle] Baker in Mart.
Fl. Bras. 6(2): 364. 1876.

Coarse herbs or subshrubs, sparingly branched. Leaves opposite, distinctly long petioled, blades broadly deltoid, dentate or denticulate. Inflorescence a corymbose panicle. Involucre of ca 50 long appendaged phyllaries in 3-4 series; receptacles subglobose, densely short pubescent; 100-150 flowers per head; corollas narrowly tubular, 5-lobed, outer surface of corolla glabrous below, lobes slightly longer than wide with a few short stalked glands externally; stomates absent; extreme tips of lobes papillose; inner surface of corolla glabrous; cells of corollas slender with very sinuous walls. Anther collar slender, composed of mostly rectangular cells with numerous transverse thickenings. Anther appendage rather large with large cells. Style base without enlarged node, glabrous. Styler appendage narrow throughout, with very long slender imbricated papillae. Achenes prismatic, 4-5 ribbed, with occasional short stalked glands, carpopodia very distinct, tapering, composed of elongate mostly thin walled cells, upper cells of carpopodium and lower cells of ribs much enlarged. Pappus of ca 20 scabrous setae, enlarged near the tips, apical cells very blunt.

Type species: Hebeclinium hecatanthum A.P.Decandolle.

Urolepis hecatantha (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Hebeclinium hecatanthum A.P.Decandolle, Prodr. 5: 136. 1836. Hebeclinium urolepis A.P.Decandolle, Prodr. 5: 136. 1836. Argentina, Bolivia, Brazil, Paraguay.

Acknowledgement

This study was supported in part by the National Science Foundation Grant - 20502 to the senior author.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XLI.

THE GENUS, EUPATORIASTRUM.

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A critical review of Eupatoriastrum reveals a natural group of three species characterized by large many flowered heads with interspersed paleae, by somewhat shortened anther appendages, and by broadly triangular to nearly orbicular leaves which are larger and sometimes deeply cleft nearer the base of the plant. The diversity between the three species in size, form of leaves, corolla pubescence, anther appendages, and details of the pappus and carpodium indicates thoroughly distinct lines of development. Corolla structure and the short sometimes grooved anther appendages suggest closest relationship to the large genus Koanophyton.

Eupatoriastrum Greenm., Proc. Amer. Acad. 39: 93. 1903.

Shrubs or subshrubs, few branched. Leaves opposite, petioled, blades deltoid or ovate, basal leaves sometimes deeply lobed, margins serrate. Inflorescence a very loose panicle. Involucre of ca. 50 phyllaries in 3-5 series; receptacle highly; 100-300 flowers per head, 100-300 pales per head. Corollas tubular, 5-lobed, outer surface of corolla glabrous below, lobes about as long as wide with short stalked glands, with or without setae, tips slightly papillose; stomates absent; inner surface of corolla tube glabrous. Anther collar slender composed mostly of rectangular cells with numerous transverse thickenings; anther appendages short, composed of rather large cells. Style base without enlarged node, glabrous; stylar appendage somewhat enlarged especially near the tip, mammillose. Achenes prismatic, 4-5 ribbed with numerous setae, carpodia distinct, of quadrate cells with thin or slightly thickened walls. Pappus of 15-35 scabrous setae, apical cells acute.

Type species: Eupatoriastrum nelsonii Greenm.
Chromosome number not determined.

Our studies indicate that the genus contains the following three species.

Eupatoriastrum angulifolium (B.L.Robinson) R.M.King & H.Robinson,
comb. nov. Eupatorium angulifolium B.L.Robinson, Contr.
Gray Herb. n.s. 65: 46. 1922. Guatemala, Mexico.

Eupatoriastrum nelsonii Greenm., Proc. Amer. Acad. 39: 93. 1903.
El Salvador, Mexico.

Eupatoriastrum triangulare (A.P.Decandolle) B.L.Robinson, Contr.
Gray Herb. n.s. 68: 34. 1923. Bulbostylis triangularis A. P.
Decandolle, Prodr. 7: 268. 1838. Eupatorium vitifolium
Schultz-Bip. ex Klatt, Leopoldina 20: 90. 1884. Mexico.

Acknowledgement

This study was supported in part by the National Science
Foundation Grant - 20502 to the senior author.

RE-ESTABLISHMENT OF THE GENUS ALDAMA
(COMPOSITAE-HELICANTHEAE)

Charles Feddema

Forest Service Herbarium

ALDAMA and A. dentata were described as new by La Llave and Lexarza (1824) from plants collected near Córdoba in Veracruz, Mexico. Lessing (1830, 1834) assigned a Schiede collection from near Jalapa (225) to Aldama dentata and in the earlier paper included a description of the genus and species and drawings of floral and inflorescence details. He described A. dentata as erect while noting that La Llave had described it as procumbent. DeCandolle (1836) transferred A. dentata to his new Gymnopsis, a broadly conceived genus in which he included species now assigned to various other genera. DeCandolle also described as new, G. schiedeana, referring to the Schiede collection. He described G. dentata as erect and having a conical receptacle but G. schiedeana as procumbent and having a convex receptacle. Bentham and Hooker (1860) accepted both of these species but considered them best assigned to Sclerocarpus, and Hemsley (1881) made the new combinations. Since that time Aldama has been included in Sclerocarpus by most authors although application of the binomials has varied widely.

The two genera, Sclerocarpus, as typified by S. africanus, and Aldama, as typified by A. dentata, are superficially similar. Both have neutral ray flowers with yellow ligules and perfect tubular disk flowers. In both genera the receptacular bract completely surrounds the mature marginal disk achene and becomes somewhat thickened and sculptured. The bract in Aldama, however, remains relatively thin and pithy and is easily removed from about the achene while the bract in Sclerocarpus becomes thick and hard and difficult to remove. There are a number of other significant differences between Aldama and Sclerocarpus suggesting strongly that they be considered distinct. These are indicated in the following table.

Major Characters Differentiating Aldama from Sclerocarpus

Aldama	Sclerocarpus
Leaf blade lanceolate; margin entire or minutely denticulate. Petiole short.	Blade ovate-trullate or deltoid; margin coarsely toothed or dissected. Petiole long.
Involucre biseriate; bracts dark or brownish, appressed to the flowers.	Involucre uniseriate or rarely biseriate; bracts green, spreading or reflexed.
Receptacle convex.	Receptacle ovoid or conical.
Ray flowers with short tube and linear-oblong ligules.	Ray flowers with long tube, the ligules ovate to orbicular.
Ray achenes loculate, thin-walled, flattened when dry.	Ray achenes usually fleshy throughout, often twisted when dry.
Disk flowers with definite short tube, 10-nerved; lobes short, deltoid, unbearded.	Disk flowers without definite tube, mostly 5-nerved; lobes long-lanceolate, often dark bearded within.
Anthers brownish, exerted at anthesis; connective short, deltoid.	Anthers yellow, usually retained in the corolla; connective long-lanceolate.
Style short, the branches flattened, broadest just below the apex.	Style long, the branches terete, attenuate.
Mature marginal disk achenes often radially compressed-trigonal.	Mature marginal disk achenes usually subterete or somewhat laterally compressed.
Mature marginal receptacular bracts thin, chartaceous-pithy, corrugate, wrinkled or pitted, sometimes with 2 prominent lateral ribs.	Mature marginal receptacular bracts thick and sclerified, rarely tough and fibrous, usually with raised tubercles, occasionally with low longitudinal ribs.
Chromosome number, $N = 17$.	Chromosome numbers, $N = 11, 12, 14, 18$.

Study of a duplicate of Schiede 225 indicates that it is assignable to Aldama dentata. La Llave's description of A. dentata as procumbent may be explained by the condition of plants which may survive well beyond the normal growing season. A. dentata was described as flowering in March. At this time of the year in Córdoba, where the type was collected, plants of the previous year may occasionally be found with the apex having died back or having been grazed and with only one or a few procumbent basal branches remaining. These sometimes root at basal nodes leaving little evidence of the original stem and roots. DeCandolle's description of the receptacle of Gymnopsis (Aldama) dentata as conical and that of G. schiedeana as convex is probably due to the different appearance of the receptacle when young and after maturity. While the flowers are maturing, the receptacle is convex. After the achenes and receptacular bracts are shed, the drying receptacle constricts marginally, forcing the center of the disk higher. Plants from northern South America, usually identified as Sclerocarpus coffeacola Klatt are also assignable to Aldama dentata although specimens from this region tend to be smaller and have smaller heads than those from Mexico and Central America. All the specimens of Aldama examined can be assigned to the single species, Aldama dentata.

SYSTEMATIC TREATMENT

ALDAMA La Llave & Lexarza, Nov. Veg. Descr. 14. 1824.

Type species: Aldama dentata La Llave & Lexarza.

Gymnopsis DC., Prodr. 5:461. 1836. (In part).

Sclerocarpus. (Of authors, in part).

Erect herbaceous annals, strigose-hispidulous; branching opposite below, alternate above; leaves lanceolate, short-petiolate, blade shallow-toothed or subentire; heads numerous, radiate, often long pedunculate; receptacle chaffy, convex or drying conoid; involucre campanulate, biseriate; involucral bracts subfoliaceous, appressed to the disk flowers; ray flowers neutral, sterile, the achenes thin-walled, locular, flattened when dry; disk flowers perfect, fertile, the corolla tubular, 10-nerved, with definite tube and limb; stigmas somewhat flattened, broadest below apex; mature receptacular bracts enclosing the achenes and shed with them; mature marginal receptacular bracts radially or laterally compressed, thick, pithy, the surface prominently pitted and ridged; achenes black, pappus a low crown of basally fused bristles, a low ridge or absent.

ALDAMA DENTATA La Llave & Lexarza, Nov. Veg. Descr. 14. 1824.

Type: MEXICO: VERACRUZ: Córdoba: "...in inundatis rivuli Huehueyapa S. Josephi del Corral." (Holotype not seen, possibly not extant).

Gymnopsis dentata (La Llave & Lexarza) DC., Prodr. 5:561. 1836.

Gymnopsis schiedeana DC., Prodr. 5:561. Type: MEXICO: VERACRUZ: "...inter segetes ad margines dumetorum Jalappam, Jun," G. Schiede 225 (Holotype probably at HAL, isotype MO!).

Sclerocarpus dentatus (La Llave & Lexarza) Benth. & Hook. f. ex Hemsl. Biol. Cent. Am. Bot. 2:164. 1881.

Sclerocarpus schideanus (DC.) Benth. & Hook. f. ex Hemsl. Biol. Cent. Am. Bot. 2:164. 1881.

Sclerocarpus kerberi Fourn., Bull. Bot. Soc. Fr. 20:183. 1883. Type: MEXICO: VERACRUZ: Córdoba, 31 Jul 1882. E. Kerber 19 (Holotype M; isotype K!; type fragment F!).

Sclerocarpus coffeaecolus Klatt., Ann. Naturh. Hofmus. Wein. 9:360. 1895. Syntypes: COLUMBIA (VENEZUELA): Valle de Aragua, Hacienda Palmar de San Matthes, E. Otto 811 (?) (Holotype probably at W, not seen, isotype GH!; type fragment US!); Moritz 25, no date or locality (Holotype probably at W, not seen); Grosourdy 1862, without collection number or locality (Holotype probably at W, not seen). (Isotype of E. Otto 811 (?) here designated Lectotype: GH!).

Sclerocarpus schideanus var. elongatus Greenm., Proc. Am. Acad. 32:309. 1897. Syntypes: MEXICO: VERACRUZ: Wartenburg, near Tantoyuca, 1895, L. C. Ervendberg 98, 99 (GH!); MORELOS: fields around Cuernavaca, 31 Oct 1896, C. G. Pringle 6606 (GH! MICH! MO! NY! US! VT!). (Isotype of Pringle 6606 here designated Lectotype: MO!).

Gymnolomia acuminata Blake ex Robinson., Proc. Am. Acad. 49:505. 1913. Type: MEXICO: TAMAULIPAS: "prope Gómez Fariás," 13-21 Apr 1907, E. Palmer 582 (Holotype GH!; isotypes F! NY! US!).

Sclerocarpus elongatus (Greenm.) Greenm. & Thompson.,
Ann. Mo. Bot. Gard. 1:412. 1915.

Erect annuals, sometimes long-lived, (0.3) 0.7-1.5 (2.5) m. tall, mostly strigose-hispidulous; leaves opposite below, alternate above, (1) 4-8 (14) cm. long; petioles 2-15 mm. long; blades linear-lanceolate to narrowly ovate, scabrous to substrigose above, strigose-hispidulous beneath, mostly minutely few-toothed, apex acute-acuminate, rarely obtuse, base cuneate or rounded; heads numerous, (3) 6-10 (13) mm. high, solitary, terminating the branches or 2-3 together, the terminal one sometimes with peduncles 7-13 cm. long; involucre biseriate, campanulate, mostly 5-9 mm. high; outer involucral bracts elliptic-lanceolate to ovate, scabrous to strigose, ciliate, apex acute to obtuse, sometimes squarrose, often dark veined; inner involucral bracts mostly equaling in number and subtending the rays, usually longer and broader than the outer bracts, the apex often obtuse or rounded; ray flowers 5-7 (11), ligules linear-oblong (2.5) 8-13 (18) mm. long, mostly shallow-toothed, ray achenes epappose or with minute scales on the angles; disk flowers (8) 20-70, the corolla (2.5) 4-6 mm. long, yellow-orange, the lobes sometimes reddish; mature receptacular bracts 2.4-3.5 mm. long, brownish, purple or mottled, laterally compressed or the marginal ones radially compressed-trigonus with thickened lateral ribs, the surface mostly glabrous, shallowly wrinkled or with deep pits and prominent irregular ridges; bracts of the central disk to 8 mm. long, tubular or laterally compressed with an apical tooth surpassing the corollas; achenes of the marginal disk flowers 2-3.5 mm. long, obovoid-fusiform, trigonus or laterally compressed and narrowly and obliquely obovoid, pappus mostly minute or absent, rarely a short scale or tooth.

Two varieties of Aldama dentata are distinguishable. In addition to the typical variety, three collections from western Michoacán and southeastern Jalisco represent a previously undescribed variety. These varieties may be distinguished by means of the following key.

KEY TO THE VARIETIES OF ALDAMA DENTATA

Outer involucral bracts conspicuously shorter than the inner; apex of the inner bracts mostly obtuse or rounded; peduncles mostly strigose-pilose with appressed or spreading hairs mostly less than 1.5 mm. long
. 1. var. dentata

Outer involucrel bracts subequal to the inner; apex of the inner bracts narrowly acute or strongly acuminate; peduncles with coarse spreading hairs mostly more than 1.5 mm. long2. var. zamorensis

1. ALDAMA DENTATA La Llave & Lexarza var. DENTATA.

This variety is variable and widespread. It is somewhat weedy in habit and sometimes is a dominant species in fallow grain fields. It is usually shorter than the following variety often not exceeding one-half meter in height.

Distribution: Eastern Mexico including southern Tamaulipas and Veracruz; central Mexico, including Querétaro, México and Morelos; western Mexico, including Nayarit, Jalisco, Colima, and Michoacán; southern Mexico including Puebla, Oaxaca and Chiapas; British Honduras, Honduras, Guatemala and Northern Venezuela.

Chromosome number: $N = 17$ (Feddema 1541, 1556, MICH).

2. ALDAMA DENTATA La Llave & Lexarza var. ZAMORENSIS Feddema, var. nov.

Var. hirsuta, pilis plerumque 1-3 mm. longis; involucri bracteae interiores anguste acutae vel forte acuminae; receptaculum plerumque ovatum; marginis disci paleae matureae, purpureae, laevigatae, vel leviter aspero-corrugatae; radiorum achaenia epapposa vel pappus vix 0.1 mm. longus.

Type: MEXICO: MICHOACAN: 27 km SE of Zamora, 16 Aug 1961, Feddema 1724 (Holotype MICH).

Pubescence of the younger portions of the stem, branches and peduncles mostly hirsute with stiff, spreading hairs 1.5-3.0 mm. long with prominent, yellowish bases; receptacle low-convex or ovoid-conoid when living, becoming strongly ovoid-conoid after the fall of the achenes; inner involucrel bracts only slightly longer than the outer, the apex narrowly acute or strongly acuminate; exposed adaxial surface of the involucrel bracts with mostly suberect, yellowish hairs mostly more than 1.4 mm. long; ray achenes epappose or with a pappus only suggested by low irregularities apically on the angles; mature marginal receptacular bracts mostly laterally compressed, rarely a few radially compressed, the surface mostly slightly irregularly wrinkled, usually without prominent, wing-like ribs laterally; marginal disk achenes epappose or with the pappus reduced to a low collar or irregular rim.

Chromosome number: $N = 17$ (Feddema 1724 MICH).

Other specimens examined: MEXICO: JALISCO: 1 mi. W. of Ayo el Chico, 23 Aug 1958, R. McVaugh 17208 (MICH); MICHOACAN: 2 mi. E. of Zamora, 6 Aug 1960, R. M. King 3645 (MICH, NY, TEX, US).

ACKNOWLEDGMENTS

I wish to express appreciation to Dr. Rogers McVaugh for assistance given during the course of this study, and to Dr. F. J. Hermann and Dr. Tod F. Stuessy who read the manuscript.

LITERATURE CITED

- Bentham, G. and J. D. Hooker. 1865. *Genera Plantarum*. 2:364.
- Candolle, A. P. de. 1836. *Prodromus Systematis Naturalis Regni Vegetabilis*. 5:566.
- Hemsley, W. B. In: Godman and Savin. 1881. *Biologia Centrali-Americana*. Botany. 1:364.
- La Llave, P. and J. Lexarza. 1824. *Novorum Vegetabilium Descriptiones*. 1:14.
- Lessing, F. C. 1830. *Synanthereae*. In: Schlechtendal, D. de and A. de Chamisso., *Plantarum Mexicanarum a cel, viris Schiede et Deppe collectarum*. (Continuatio prima.) *Linnaea* 5:128-164; table II.
- _____. 1834. *Compositae*. In: Schlechtendal, D. de., *De Plantis Mexicanis a G. Schiede M. Dre. collectis nuntiam adfert a D. F. L. De Schlechtendal*. (Continuatio.) *Linnaea* 9:263-272.

SOME ALEURITES TAXA IN HAWAII
AND
A NOTE REGARDING ARGEMONE

Otto & Isa Degener

Due to Dr. B.C. Stone's wanderlust and resulting peregrinations from the University of Hawaii to the Smithsonian, then to the College of Guam, and now to the University of Malaya at Kuala Lumpur, our plans, agreeable to us three by letter to jointly describe a "mango-leaved" taxon of Aleurites, went awry. In fact, even the small specimen we had mailed him on loan as type and cotypes is presumably stored in some forgotten herbarium cabinet in one of the above institutions and presently beyond reach.

Now we two find the new taxon named in Pacific Science as a nom. nud. As agreed by past correspondence (much pertaining to plants has been deposited in the Hunt Botanical Library in Pittsburgh), we three validly name this novelty as follows:

ALEURITES MOLUCCANA var. KATOI Degeners & Stone. A var. moluccana folia lanceolata differt.
KATO KUKUI, MANGO-LEAVED KUKUI

Aleurites moluccana var. katoi Degeners & Stone nom. nud., ex Stone in Pac. Sci. 21:553. 1967.

The variety katoi differs mainly from the var. moluccana in bearing lanceolate leaves occasionally widened by two obscure lobes near base of blade.

As stated on page 553, the taxon "is named for Mr. Tadayuki Kato of Kauai High School, who has been very helpful to me and to other visiting botanists. The holotype specimen, taken from the tree on the grounds of Kauai High School in Lihue, is at the Bishop Museum (Stone 3427, collected on 15 April 1960)." That "A further specimen collected by Dr. Degener is also available" is not strictly correct. Otto & Isa Degener 23,956 was collected by Mr. Hans W. Hansen from a cultivated tree on Kauai on Sept. 24, 1955. Whether Degeners 23,956 of 1955 and Stone (collected with Kato according to herbarium sheet label) 3,427 of 1960 are from the same tree, we do not know. According to Mr. Hansen, his plant was a cultivated one and was said to be native to Samoa.

In Hawaiian and most other Polynesian dialects, typical Aleurites moluccana is known as "kukui" or some variant of this spelling. In English it is often called the "candlenut tree," referring to its former use as a source of light. The

Kato kukui, with its unusual "mango leaves," is conspicuous and attractive. So by this time it may be seen cultivated here and there about residences and in parks.

ALEURITES MOLUCCANA var. REMYI (Sherff) Stone, the Remy kukui, is a reduction made in the same publication by Stone of A. remyi Sherff in Field Mus. Bot. Ser. 17:558. 1939. We early followed Dr. Sherff, printing an illustrated description of this taxon in our Flora Hawaiiensis. After studying a large series of sheets of Aleurites recently, we noted that both the remyi and the katoi tendencies occur in various islands of the South Pacific. We now tend to the belief that Stone's interpretation may be the superior one.

The first paragraph of Stone's page 552 is obviously garbled: The "mango-leaved" kukui (var. katoi) with practically no lobes is obviously not the same as the "Kona" kukui (var. remyi) with very narrow lobes.

ALEURITES MOLUCCANA var. AULANII Deg. & Deg. var. nov. Arbor
seminibus circa 23 mm. latis.
AULANI KUKUI, SMALL-SEEDED KUKUI

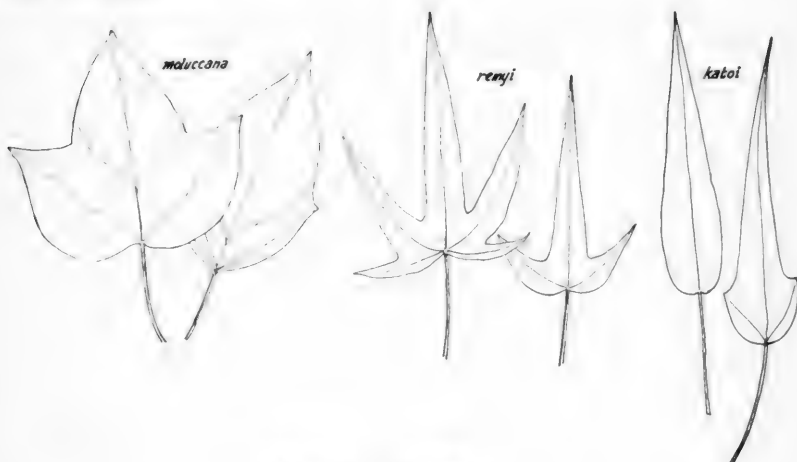
This hitherto undescribed variety has seeds about 23 mm. wide, 15 mm. thick and 20 mm. high; while the ubiquitous var. moluccana has them commonly 30 mm. wide, 23 mm. thick and 30 mm. high. The type is Deg. & Deg. 32,481. Collected in Kukuihaele, Hawaii, by Stanley and Aulani Loo, March 28, 1971, and deposited in NY.

The botanical recognition of this taxon was fortuitous. Forced by a broken tooth into Dr. Robert N. Ogawa's dental chair in Hilo, Hawaii, the kane patient learned that Mrs. Ogawa was an amateur botanist, the daughter a professional botanist with the University of Michigan, and Dr. Ogawa himself an ardent maker of seed lei or necklaces as a hobby. In the case of the kukui "nut," turned ebony black by burial in a taro patch, Dr. Ogawa explained his perfected method of preparing the seeds. The conversation then changed to the prevalent rumor of a small-seeded kukui growing in isolated Waipio Valley, District of Kohala. Apparently only one tree remains in this once heavily populated valley, badly mauled by careless collectors of its prized seeds. The dentist was a bit evasive.

Returning for further treatment days later, the patient was surprised and delighted to receive from Dr. & Mrs. Ogawa a truly regal lei for Mrs. Degener consisting of 25 matched, dwarf kukui seeds originally collected in Waipio Valley and neighboring Kukuihaele. "Kukuihaele," contrary to our hope, does not refer to this rare kukui variety. The complex word

means "moving kukui tree," probably in allusion to the action on the trees of the strong trade winds funneled between the heights of Mauna Kea and Kohala.

As one surprise deserves another, the writers named this new taxon provisionally var. ogawae, mailing a copy of the manuscript to Mrs. Ogawa with the plea she furnish good flowering and fruiting material from a chosen tree as type and co-type specimens.



After B.C. Stone

The third surprise was an answering 'phone call from Mrs. Ogawa: The couple had not collected the material at all. The collector had been Mr. Stanley *Kolomona Loo, a resident of Honokaa of Chinese-Hawaiian ancestry, and his son Aulani. The family knows of two trees growing on such precipitous terrain that the father must help his son Aulani to and from the trees with aid of a rope. As these trees are such a rarity and might be injured by vandals or careless visitors, we feel it wise not to divulge their location. Because of Mrs. Ogawa's insistence and Mr. Loo's knowledge and advice, we here name the plant in his son's honor Aleurites moluccana var. aulanii. The name "Aulani" is particularly appropriate for the kukui or candlenut as it means "Light of Heaven" in Hawaiian.

The unspoiled native Hawaiian forests (some have escaped lumbering, or bulldozing for other commercial interests) seem

*As the Hawaiian alphabet lacks the letter "S", "K" is substituted for it.

with endemic birds and endemic insects, all nicely adjusted to one another over eons of time. On the contrary, as we have mentioned elsewhere, our kukui forests are conspicuously silent except for the occasional thud of a heavy kukui fruit striking the ground; nor are they teeming with insects. Furthermore, thus far no one has unearthed kukui pollen among other fossil pollens in old, undisturbed layers of earth. These observations and the fact that the kukui is so valuable to the Polynesians for light, food, medicine, native jewelry, tapa dye, gum and for tanning fishnets moves us to the belief that the tree is of aboriginal introduction from the South. Birds and insects, during the couple thousand years of its possible introduction, simply have not yet had time to become adjusted to the plant or to evolve with the plant as they have done to the unquestionable endemic ones in the Hawaiian flora.

Whether the rumor is true regarding the arrival at least of one tree of variety katoī coming from Tahiti or Samoa presumably since the landing of Captain Cook in 1778, we are almost certain that varieties remyi and ualanii were here before that date. Did such taxa develop de novo in the Hawaiian Islands, or are they relics of taxa the Polynesians had brought with them from the South? If the latter is true, a careful comparison in museums of taxa in the Hawaiian Archipelago with those in the South Seas should add evidence as to the migrations and island stop-overs made before these vikings of the sunrise settled in Hawaii Nei to intermarry, multiply and become amalgamated into a distinct race recognizable by their distinctive features as the true kamaaina.

Should the pricklepoppy once so common on Oahu be Argemone glauca L., A. glauca Pope, A. glauca (Prain) Degener or A. glauca (Prain) Deg. & Deg.? Regarding Dr. Stone's assumptions about the Argemone binomial, appearing in the same article on page 550, the kane writer had the simple explanation had he been asked for it. He enrolled at the University of Hawaii for the 1922-23 school year, frequently taking the Honolulu trolley to the end of the Kaimuki line. There he botanized in the red 'dobe soil and dust, collecting such xerophytes as Waltheria, Sida, Lipochaeta, Jacquemontia and Argemone, plants now replaced by houses and watered lawns with bordering cultigens. A New Yorker, he returned to his home, enrolling for an advanced degree at Columbia University, though spending most of his time critically identifying his Hawaiian collections at the affiliate, the New York Botanical Garden. There he identified the Argemone, judging its correct name to be Argemone glauca (Prain) Degener and thus noting it in his manuscript for a "Flora Hawaiiensis" he hoped eventually to publish. In fact, he printed the name "Argemone glauca" in 1930 in his "Plants Hawaii National Park."

While he was at his home on Vancouver Highway, later re-named University Avenue, Honolulu, Dr. Willis Pope, first President of the College of Hawaii in fact but not in name and later prominent horticulturist of the government experiment station in Makiki Valley, came to visit him with the bulky manuscript of his "Manual Wayside Plants Hawaii." He left it with the writer, who spent the better part of a week sometimes with Dr. Pope but mostly alone, revising it. One of the first deletions he recommended which, however, was not followed, were marine algae! Among one of the many corrections he made was changing Pope's name of Argemone mexicana to A. glauca (Prain) Degener. Whether Dr. Pope or more likely some later reviser of the same manuscript altered the authority to "Argemone glauca L.", wissen nur die Götter. As the Degeners have been in frequent correspondence for decades with Dr. Stone mainly concerning the genus Pelea, a simple inquiry about Argemone would have saved the making of unnecessary assumptions.

ADDITIONAL NOTES ON THE GENUS HIEROBOTANA. II

Harold N. Moldenke

HIEROBOTANA Briq.

Additional bibliography: Moldenke, *Phytologia* 21: 31. 1971.

HIEROBOTANA INFLATA (H.B.K.) Briq.

Additional citations: ECUADOR: Imbabura: Firmin 366 (W-11420592). Pichincha: Benoist 2091 (S); Herb. Inst. Cienc. Nat. Univ. Cent. Quito 11 (Ac); Prescott 302 (Du-377624, N). Tunguragua: A. S. Hitchcock 21737 (W-1196491); Pachano 144 (W-1044625), 156 (W-1044637). Province undetermined: L. Fraser s.n. (Bm). PERU: Ica: Hrdlicka s.n. [March 1913] (W-602736). Department undetermined: Barclay 2363 (Bm).

PRITCHARDIA AND COCOS IN THE HAWAIIAN ISLANDS
Otto & Isa Degener

When the Hawaiian Islands were rediscovered by Captain James Pate Cook in 1778, only two genera of palms grew in the archipelago. The one was Pritchardia, consisting of many taxa of fan-leaved or palmate palms; the other, Cocos, consisting of a single species of feather-leaved or plumose palm. Odoardo Beccari and Joseph F. Rock in 1921 published their beautifully illustrated work entitled *A Monographic Study of the Genus Pritchardia, 1-77. It is the last, authoritative work on the group. Though we know it conceals errors, we do not yet know enough to correct them. The species are native mostly to Micronesia and Polynesia, attaining their major development in the Hawaiian Archipelago. They grow from sea level to about 5,000 feet elevation; from desert to dense rainforest. According to Beccari & Rock's findings, there are about 25 species and five varieties extending from the Island of Hawaii westward to distant Nihoa. Since 1921 additional taxa have been described, some of questionable validity.

Beccari & Rock describe as new, single individual palm trees growing in hot, lowland gardens, and not known anywhere in the wild. Could not such individual palms be the offspring of seeds collected in the rainy mountains of our islands? Do they merely look new because they are growing under greatly changed conditions? We do not presently know.

One of our local botanists, Dr. Harold St. John, collected specimens from a single palm in the mountains near Punaluu, Oahu and, using the monograph, keyed it to a certain species. At a different season he visited the identical palm, collected additional material and, using the same key, came to an entirely different species! Obviously, something is wrong somewhere.

While botanizing for five months in 1928 on Molokai, the kane writer searched for Pritchardia, known to Hawaiians as loulou, and noted some growing cultivated near the coast in the garden of an elderly Hawaiian known to him as Levi. From his part-Hawaiian assistant, in whom Levi had confided, he learned that Rock had heard about loulou palms growing in some Molokai fastness. He offered Levi pay to fetch him specimens. As Rock refused the price Levi wanted, Levi resolved to have his cake and eat it too. So he agreed to Rock's more modest offer but, instead of climbing the mountain range to get specimens of the elusive palm, he merely substituted material from one of the trees in his yard. Levi thought it a great

*Mem. B.P. Bish. Mus. 8(1).

joke, and chuckled while telling the writer's assistant about the deception. Evidently some Molokai taxon is listed erroneously in the monograph as to habitat.

We see no way of greatly revising Beccari & Rock's work, excellent for the time and conditions under which it was produced, without concentrating on collecting herbarium specimens from all colonies still extant, a task easily facilitated by airplane spotting of these conspicuous trees. Seeds from each colony, preferably from the same palm from which voucher material had been preserved, should then be planted under uniform conditions with similarly procured seeds from other colonies. Such cultivated plants must then be compared with one another when they finally flower and fruit, as well as against the vouchers collected from the parent plants many years before. The difficulty of such a project is the gathering of material so often growing in almost inaccessible jungles and on cliffs, the acreage needed for the tests, the length of time before a seedling finally matures to produce diagnostic characters of flower and fruit, and the pathetic fact that so many of such distinctive colonies already have succumbed to the bulldozing "progress" of so-called civilized man. The investigator will not be sure if the old, historical specimens collected by Rock and others had not come from such colonies that are now extinct. Even though the task of getting order out of chaos seems hopeless, Foster Botanical Garden under Director Paul R. Weissich has made a good beginning.

If the above preamble is correct, it is obvious that many kinds of loulou are endemic to the Hawaiian Islands, even though no one yet knows how many species and varieties existed here in 1778. It is also plain that this genus must have been in the Hawaiian Islands for eons - certainly before the arrival of the Polynesians - to enable it to speciate to such an extent.

The fossil record certainly proves the antiquity of the loulou. Until recent bulldozing on Oahu destroyed them, erect molds of the trunks were observable on the north side of the road leading mauka to the U.S. Army Tripler General Hospital. Such palms were thriving until the lower parts of their smooth trunks were buried by the rain of ash that fell during the explosions that formed Salt Lake Crater.

On the Island of Hawaii at Kailiili, near Wahaula within Hawaii Volcanoes National Park, a few impressions of prostrate trunks can be seen on a prehistoric though not very old pahoehoe lava flow. Beyond the southwestern boundary of the National Park, between the main road and the ocean, at *Kawaa, lies an expanse of prehistoric, smooth pahoehoe.

*Incorrectly spelled "Kawa" on some Government maps.

Armed with camera, broom, whiskbroom and trowel, the writers and Mr. & Mrs. Theodore L. Picco fanned over the area. Here the pahoehoe had gently flowed through a palm grove, the wet trunks burning slowly through the base so that the trees fell helter skelter upon the cooling lava. Several score impressions were carefully examined, all showing the relatively smooth, unbranched outline of a side of the palm trunk (Fig. a). Many also showed rectangular checks formed as the lava oozed into the charring wood (Figures b, c). One impression even showed the base of a fan-like blade (Fig. d),



Figures a,b,c. Trough-like *Pritchardia* tree molds, c at left showing impressions of checked charcoal.



resembling that of a modern Pritchardia (Fig. e) now growing at nearby Punaluu. Not a single trunk impression exhibited leaf scars. No palm fruits nor seeds were observed.



Fossil (Fig. d) and modern (Fig. e) leaf blades.

"According to tradition, at least the large-fruited type of coconut known as niupolapola was brought to the Hawaiian Islands by the early Polynesian immigrants from Bolabola, an island not far from Tahiti. Before Captain Cook's coming the Hawaiians knew also a few other kinds, such as the niuhiwa with dark-colored fruit and the niulelo with yellowish fruit."* The fruit was both food and drink for the Polynesian voyagers, and certainly the most necessary and efficient supply of a potable liquid in transportable form for a long ocean voyage. We surmise some coconuts escaped being consumed, and were planted in the newly discovered islands.

Between Kawa Bay and the boundary of the National Park is the coastal village of Punaluu. Just back of the black sand beach is a mixed grove of loulou (Pritchardia affinis Beccari) and niu or coconut (Cocos nucifera L.) palms. The

*Degener, O., Plants Haw. Nat. Park, 72. 1930.

former, a fan palm, bears erect, slender trunks hardly thickened at base and without prominent leaf scars. The latter, a feather palm, bears a curving trunk thickened at base and somewhat constricted at the prominent leaf scars. The contrast is well shown in figures f and g. with these differences in mind, the reader should compare the photographs of the living trees with those of the fossils.



Figures f and g showing two coconut palm trunks with prominent leaf scars and several Pritchardia trunks with obscure leaf scars.

In conclusion, the writers are convinced that the loulou reached the Hawaiian Islands some eons ago, and may have even more or less encircled many stretches of the Islands with extensive groves, particularly before the Polynesians brought the pig and, perhaps as stowaway, the seed-eating Polynesian rat. The fossil impressions at Kailiili and above all at Kawaa are irrefutable proof of this fact. These beautiful palms may well have extended along the shore of Hawaii Volcanoes National Park, and hence deserve replacement. Regarding the coconut, however, we consider it a newcomer to the Hawaiian Islands until irrefutable evidence to the contrary appears. Tradition bolsters this belief as well as the fact that no fossil imprints of a coconut palm have ever

been seen, not even at Kawa Bay where conditions were ideal for its growth and fossilization.

Many have been confounded by the loulou growing in such isolated localities. It is of course possible that those trees perched on cliffs reached there as fruits falling or washing down from the plateau forest above. Or a grove may have existed for ages on a plateau before this was slowly eroded into gulches and finally into cliff-flanked canyons. The grove of palms simply continued to grow in the same spot from generation to generation, first on gulch sides and finally on the resultant cliffs. All this is possible, but is it probable? On the Island of Hawaii lives the native crow alala (Corvus tropicus Gmelin). To be sure all crows are black; but this one, as the kane writer observed in 1927 in the Kona jungle, is unique in keeping its bill agape to exhibit to its mate the beautiful akala-berry-red surface within. Evidently the ancestors of such a species, now so distinctive, must have come to the Archipelago eons ago. Today the species is on the verge of extinction, perhaps less than a dozen individuals persisting on the Island of Hawaii. In 1891, however, when the ornithologist George C. Munro surveyed this island for birds "the alala was numerous. They were in flocks - -." Perhaps crows and/or other large, seed eating birds were numerous also on some of the remaining islands and aided in the early distribution of the loulou. If "civilized" man could just about exterminate the crow on the Island of Hawaii from flocks to perhaps less than a dozen individuals in eighty years, what could not the natives have accomplished during the past few thousand? We know "The Hawaiians snared the crow and used the black feathers for kahilis and for dressing idols."

There is hope for the preservation of the Pritchardia molds because these and the archaeological features of the general area can be of value to the lucrative tourist industry. Besides having these easily accessible and clear, prostrate tree molds, the Kawa Bay region is flanked to the northeast by the ruins of the massive Keeku heiau or temple. This must have catered to a large neighboring population attracted by the beach and the nearby freshwater springs. Unfortunately the many house sites have been washed flat by the tsunami of 1868; but ilili, or smooth water-worn pebbles from the beach and from the flooring of the huts, are scattered everywhere. One even finds evidence of ancient pleasures and industry. Here and there, pecked into flat, smooth lava are the depressions of the papamu, or checker-board (Fig. h), upon which the Hawaiians played konane with white coral pebbles against black lava ones; and along the rocky coast are cup-like depressions ("baitcups") in which the natives pounded their churning material used

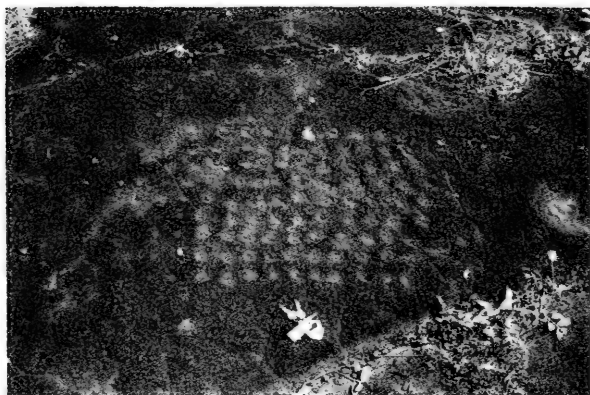


Fig. h, a papamu.

for luring fish. A few stone "salt pans" in which seawater was evaporated to gain salt for barter with upland residents are also there. Such an area rich in Hawaiiana and fossils may well escape destruction.

We are grateful to Mr. & Mrs. Picco for helping us sweep and for taking the photographs.

STUDIES IN THE SOPHOREAE (LEGUMINOSAE) I.

Velva E. Rudd

In connection with studies in the tribe Sophoreae for North American Flora and Flora Neotropica it has been found that the following new combinations and taxa are necessary:

1. SOPHORA L. section AIGIALODES Rudd, sect. nov.

Frutices, interdum subscandentes; foliola subcoriacea; stipulae lineari-deltaeidae aut nullae; inflorescentia racemosa, terminalis; calyx truncatus vel subtruncatus; corolla alba vel aurea, petalis carinalis plerumque connatis; fructus torulosus.

Type species: Sophora tomentosa L. The name Aigialodes is from the Greek, meaning a dweller by the sea.

2. SOPHORA L. section ORESBIOS Rudd, sect. nov.

Arbores; foliola coriacea; inflorescentia racemosa, axillaris; calyx truncatus; corolla violacea, petalis carinalis discretis; fructus ignotus.

Type species: Sophora konzattii Standl. The name Oresbios is from the Greek, meaning a dweller on the mountain.

3. SOPHORA L. section CALIA (Berlandier) Rudd, comb. nov.

Calia Berlandier in Mier Terán, Mem. Comisión Límites 13. 1832

Type species: Sophora secundiflora (Gómez Ortega) Lag. ex DC.

4. CLADRASTIS KENTUCKEA (Dum.-Cours.) Rudd, comb. nov.

Sophora kentuckea Dum.-Cours. Bot. Cult. ed. 2, 6: 56. 1811.

Virgilia lutea F. Michx. Hist. Arb. For. Amer. Sept. 3: 266, pl. 3. 1813.

Virgilia alba Raf. Kentucky Gaz. 1822, fide Raf. Cincinnati Lit. Gaz. 1: 60. 1824.

Cladrastis fragrans Raf. Cincinnati Lit. Gaz. 1: 60. 1824.

Cladrastis tinctoria Raf. Neogen. 1: 1825.

Virgilia kentuckea (Dum.-Cours.) ex Raf. Neogen. 1. 1825, as "kentuckensis."

Cladrastis albiflora Raf. New Fl. Amer. 3: 83. 1836.

Cladrastis lutea (F. Michx.) K. Koch, Dendrol. 1: 6. 1869.

Cladrastis kentuckea (Dum.-Cours.) Raf. ex B. D. Jackson, Index Kew. 1: 552. 1895, as "kentuckensis", as synonym.

Unless proof can be found that the title-page date of 1811 for Dumont de Courset, Le botaniste cultivateur, ed. 2, vol. 6 is incorrect, the epithet kentuckea has priority over lutea.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XVI

Harold N. Moldenke

CALLICARPA L.

Additional synonymy: Tometax L. apud Raizada, Indian Forest. 92: 304, in syn. 1966.

Additional & emended bibliography: Rheede & Munnicks, Hort. Ind. Malab. 4: 123--124, pl. 60. 1683; Ray, Hist. Pl. 2: 1787--1788. 1693; Dassaw, Nov. Gen. Pl. Zeyl. 4--5 & [15]. 1747; L., Fl. Zeyl., ed. 1, 24 & [250] (1747) and ed. 2, 24 & [250]. 1748; Dassow in L., Amoen. Acad. 1: 389. 1749; L., Sp. Pl., ed. 2, 1: 161 & 172. 1762; J. A. Murr. in L., Syst. Nat., ed. 12, 2: 125. 1767; L., Mant. Pl. Alt. 198, 331, & [576]. 1771; J. A. Murr. in L., Syst. Veg., ed. 12 ["13"], 130 & 831. 1774; Lam., Dict. Encycl. Méth. 1: 54--55. 1783; Poir. in Lam., Encycl. Méth. Bot. 7: 697. 1806; Dennst., Schlüss. Hort. Malab. 16, 30, & 31. 1818; Ainslie, Mat. Ind. 2: 180--182. 1826; O'Shaughnessy, Beng. Disp. 456. 1841; Sieb. & Zucc., Abh. Akad. Muench. 4 (3) [Fl. Jap. Fam. Nat. 2]: 30, 115, & 155--156. 1846; R. Wight, Illustr. Ind. Bot. 2: 217, pl. 173 bis, fig. 5. 1850; Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135--136. 1853; Gamble, Man. Indian Timb., ed. 1, 282--283 & 503. 1881; Dymock, Veg. Mat. Med. W. Ind. 716 & 745. 1884; Maingay, Kew Bull. Misc. Inf. 1890: 127. 1890; Briq., Bull. Herb. Boiss., sér. 1, 4: 345--346 & 924. 1896; H. N. Ridl., Journ. Straits Med. Assoc. 5: 127. 1897; H. N. Ridl., Journ. Roy. Asiat. Soc. Straits Br. 30: 79. 1897; H. N. Ridl., Agric. Bull. Straits & Fed. Malay States 1: 218. 1902; Gamble, Man. Indian Timb., ed. 2, pr. 1, 525 & 770. 1902; Ahmad, Agric. Bull. Straits & Fed. Malay States 6: 162. 1907; Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 380--381 & 554. 1910; Perrot & Vogt, Trav. Lab. Mal. Méd. Paris 9: 215 & 223. 1913; Gamble, Man. Indian Timb., ed. 2, pr. 2, 525 & 770. 1922; H. N. Ridl., Fl. Malay Penins. 2: 614--617. 1923; Kalaw & Sacay, Philip. Agriculturist 14: 427. 1925; Janson., Mikrogr. Holzes Java 4: 774. 1928; Gimlett & Burkill, Gard. Bull. Straits Settl. 6: 354, 387, 388, & 394. 1930; Burkill & Haniff, Gard. Bull. Straits Settl. 6: 233. 1930; Villadolid & Sulit, Philip. Agriculturist 21: 30. 1932; L., Sp. Pl., ed. 1, pr. 2, 1: 111 & 118. 1934; Makins, Ident. Trees & Shrubs 74 & 258, fig. 62 G. 1936; Masam., Trans. Nat. Hist. Soc. Formos. 30: 63--65. 1940; Greene & Blomquist, Fls. South 109. 1953; T. H. Everett, Read. Dig. Compl. Book Gard. 420 & 605. 1966; Burkill, Dict. Econ. Prod. Malay Penins. 1: 407--409 & 1085. 1966; C. L. Rodgers, Castanea 34: 390. 1969; Elliotson, Complete Gard. Book South. Hemisph., ed. 6, 16 & 163. 1970; Vidal & Lemoine, Journ. Agr. Trop. & Bot. Appl. 17: 28--29. 1970; Moldenke, Phytologia 21: 149--164 & 208--242. 1971.

Greene & Blomquist (1953) give "beauty-berries" as the common

name for members of this genus. Burkill (1966) tells us that Callicarpa is "A genus of shrubs and trees....found in the warmer parts of Asia, to Australia and the Pacific, and again in America. The plants are sub-aromatic, and often bitter in taste. Throughout the East they are used medicinally: some internally, others for poulticing. Several species of America are active diuretics and purgatives. The wood is of little use. The Malayan species are much of one type, and 'tampang besi' is the name applied to the first three mentioned below [C. candicans, C. longifolia, C. maingayi], and to C. angustifolia, King and Gamble. Whether C. tomentosa differs sufficiently in medicinal uses that it should bear a distinguishing name, is not clearly demonstrated yet. The common noun 'tampang', to which attention has just been called, indicates that the plants are used for making plasters. 'Tampal' is a variant of it, and other variants may be recognized....As far to the eastward, also, as the Philippine Islands, species of Callicarpa obtain such names; and there can be no doubt that considerable reliance has been put on them as simples, from end to end of Malasia. Three species are used as fish-poisons in the Philippine Islands.....The active substance is a saponin. It is interesting that the twigs of two of them, dried until the leaves have fallen, should be used as a bait for prawns. C. reevesii, Wall., of Southern China, and several others are in cultivation in the Botanic Gardens, Singapore; for they are ornamental plants!"

CALLICARPA ACUMINATA H.B.K.

Additional bibliography: Moldenke, *Phytologia* 21: 150, 233, 235, & 240. 1971.

CALLICARPA ALBIDO-TOMENTELLA Merr.

Additional & emended bibliography: E. D. Merr., *Philip. Journ. Sci. Bot.* 12: 300—301 & 382. 1917; Moldenke, *Phytologia* 13: 438. 1966.

CALLICARPA AMERICANA L.

Additional & emended bibliography: L., *Sp. Pl.*, ed. 1, pr. 1, 1: 111. 1753; L., *Syst. Nat.*, ed. 10, 2: 894. 1759; J. A. Murr. in L., *Syst. Veg.*, ed. 12 ["13"], 130. 1774; Ainslie, *Mat. Ind.* 2: 181. 1826; L., *Sp. Pl.*, ed. 1, pr. 2, 1: 111. 1934; Makins, *Ident. Trees & Shrubs* 258. 1936; Greene & Blomquist, *Fls. South* 109. 1953; Rodgers & Shake, *Castanea* 30: 163. 1965; T. H. Everett, *Read. Dig. Compl. Book Gard.* 420 & 605. 1966; C. L. Rodgers, *Castanea* 34: 390. 1969; Moldenke, *Phytologia* 21: 150. 1971.

Additional illustrations: Greene & Blomquist, *Fls. South* 109. 1953.

CALLICARPA ANGUSTA Schau.

Additional & emended bibliography: E. D. Merr., *Philip. Journ. Sci. Bot.* 12: 299, 301, & 382. 1917; Moldenke, *Phytologia* 21: 150, 158, & 210. 1971.

Merrill (1917) states that C. subintegra Merr. resembles C.

angusta, "from which it is readily distinguished by its denser indumentum, its entire or but slightly toothed leaves, fewer nerves, and longer petioles".

The Foxworthy s.n. [Herb. Philip. Bur. Sci. 660], previously cited by me as C. angusta, is actually the type collection of C. rivularis Merr.

CALLICARPA ANGUSTIFOLIA King & Gamble

Additional bibliography: Burkill, Dict. Econ. Prod. Malay Penins. 1: 407. 1966; Moldenke, Phytologia 20: 493. 1971.

CALLICARPA ARBOREA Roxb.

Additional & amended bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 12: 298 & 382. 1917; Elm., Leaflet. Philip. Bot. 10: 3860. 1939; Deb, Sengupta, & Malick, Bull. Bot. Soc. Bengal 22: 199. 1968; Corner & Watanabe, Illustr. Guide Trop. Pl. 752. 1969; Moldenke, Phytologia 21: 151, 154, 215, 223--225, & 230. 1971.

Additional illustrations: Corner & Watanabe, Illustr. Guide Trop. Pl. 752. 1969.

Deb & his associates (1968) reduce C. arborea Roxb. to synonymy under C. tomentosa (L.) Murr.

The Kuntze 6649, distributed as C. arborea, is actually C. vestita Wall.

CALLICARPA ARBOREA var. PSILOCALYX (H. J. Lam) Moldenke

Additional synonymy: Callicarpa magna lilacina Elm., Leaflet. Philip. Bot. 10: 3860. 1939.

Additional & amended bibliography: Elm., Leaflet. Philip. Bot. 3: 1133. 1911; E. D. Merr., Philip. Journ. Sci. Bot. 12: 298 & 382. 1917; Elm., Leaflet. Philip. Bot. 9: 3222 & 3223 (1934) and 10: 3860. 1939; Moldenke, Phytologia 20: 495. 1971.

CALLICARPA BASILANENSIS Merr.

Additional bibliography: E. D. Merr., Philip. Journ. Sci. 30: 86. 1926; Moldenke, Phytologia 15: 16. 1967.

Merrill (1926) was of the opinion that this species probably belongs in the "general group with C. woodii Merr."

CALLICARPA BASITRUNCATA Merr.

Additional bibliography: G. Taylor, Ind. Kew. Suppl. 12: 27. 1959; Moldenke, Phytologia 15: 16. 1967.

CALLICARPA BAVIENSIS Moldenke

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 11: 40. 1953; Moldenke, Phytologia 14: 46. 1966.

CALLICARPA BICOLOR A. L. Juss.

Additional bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 97. 1818; E. D. Merr., Philip. Journ. Sci. 30: 426. 1926; Elm., Leaflet. Philip. Bot. 10: 3798 & 3860. 1939; Mol-

denke, *Phytologia* 20: 495—496 (1971) and 21: 36. 1971.

CALLICARPA BODINIERI Léveillé

Additional & emended bibliography: Prain, Ind. Kew. Suppl. 5, pr. 1, 43 (1921) and pr. 2, 43. 1960; Moldenke, *Phytologia* 20: 496—498 (1971) and 21: 33, 43, 46, 48, 102, 103, 108, 210, 212, 214, 240, & 241. 1971.

CALLICARPA BODINIERI var. **GIRALDII** (Hesse) Rehd.

Additional bibliography: Makins, Ident. Trees & Shrubs 258. 1936; Farnsworth, Blomster, Quimby, & Schermerhorn, Lynn Index 6: 262. 1969; Moldenke, *Phytologia* 20: 496 & 497 (1971) and 21: 33, 43, 48, 102, 103, 108, 113, 164, 210, 212, 214, & 240. 1971.

The Herb. Canton Chr. Coll. 12560, distributed as C. bodinieri var. giraldii, is actually C. rubella var. hemsleyana Diels.

CALLICARPA BORNEENSIS Moldenke

Additional bibliography: G. Taylor, Ind. Kew. Suppl. 12: 27. 1959; Moldenke, *Phytologia* 14: 63—64. 1966.

CALLICARPA BRACTEATA Dop

Additional bibliography: Moldenke, *Phytologia* 20: 498 (1971) and 21: 107 & 164. 1971.

CALLICARPA BREVIPES (Benth.) Hance

Additional bibliography: Moldenke, *Phytologia* 20: 498—499 (1971) and 21: 33, 47, 48, 102, 108, 113, 210, 212, 213, & 233. 1971.

Dop (1932) states that C. petelotii Dop resembles C. dichotoma (Lour.) K. Koch and C. brevipes in its glabrous ovary, glabrous branches and leaves, and densely punctate leaf-blades, and that it may represent a natural hybrid between C. longifolia Lam. and C. dichotoma and/or C. brevipes.

CALLICARPA CANDICANS (Burn. f.) Hochr.

Additional synonymy: Callicarpa nana L. ex Elm., Leafl. Philip. Bot. 10: 3798 & 3860, in obs. 1939. Callicarpa candicans Burn. f. ex Corner & Watanabe, Illustr. Guide Trop. Pl. 751. 1969.

Additional bibliography: Dymock, Veg. Mat. Med. W. Ind. 716 & 745. 1884; Perrot & Vogt, Trav. Lab. Mal. Méd. Paris 9: 215 & 223. 1913; Elm., Leafl. Philip. Bot. 6: 2084 & 2085. 1913; Burkill & Haniff, Gard. Bull. Straits Settl. 6: 233. 1930; Elm., Leafl. Philip. Bot. 10: 3860. 1939; Burkill, Dict. Econ. Prod. Malay Penins. 1: 407. 1966; Corner & Watanabe, Illustr. Guide Trop. Pl. 751. 1969; Moldenke, *Phytologia* 21: 151—152, 156, 215, 222, 223, & 225. 1971.

Additional illustrations: Corner & Watanabe, Illustr. Guide Trop. Pl. 751. 1969.

Burkill (1966) discusses this plant by first listing and explaining some of its vernacular names: "tampang bësi", "tampah

běsi", "tampang běsi merah" (=red-fruited tampang běsi), "tampung běsi puteh", "kuping běsi" (kuping is the crust or scab which forms over a healing sore), "hati-hati ketan" (means as being used like Coleus); in Java "mėniran bėsar", "mėniran kasar", "mėniran kėbo", "mėniran utan", "songka utan"; in Sundanese "apu-apu", "katumpang budak", "kutumpang kayu"; in Sumatra "sėtampo bėsi", "tampal bėsi", "tampa bėsi". He continues: "The tender leaves are boiled and the decoction is drunk for abdominal troubles....In Java a decoction is used for bringing on the menses, and the leaves are used for poulticing wounds and boils....Under the name 'puchuk ring-ring', the shoots of the plant have been recorded as entering into arrow-poisons.....It is one of the species....used in the Philippine Islands for stupifying fish; yet, after drying, it is also a bait for prawns."

The Kondo lh, distributed as C. candicans, is actually C. subpubescens Hook. & Arn., while Tsao-Fei 7 is C. tsiangii Moldenke.

CALLICARPA CAUDATA Maxim.

Additional & emended bibliography: Maxim., Bull. Acad. Imp. Sci. St. Pėtersb. 31: 75 & 76. 1886; Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 381 & 554. 1910; Elm., Leaf. Philip. Bot. 10: 3860. 1939; Moldenke, Phytologia 21: 33, 108, 225, 233—235, & 240. 1971.

Merrill (1910) says that C. caudata is closely allied to C. stenophylla Merr., which differs "in its less dense and simply stellate, not plumose-stellate indumentum".

The R. S. Williams 1158, cited by me in Phytologia 14: 143 (1966), is actually C. formosana f. angustata Moldenke.

CALLICARPA CAULIFLORA Merr.

Additional bibliography: Moldenke, Phytologia 16: 363 & 366. 1968.

Additional citations: PHILIPPINE ISLANDS: Leyte: M. Ramos s.n. [Herb. Philip. Bur. Sci. 41540] (N).

CALLICARPA CLEMENSORUM Moldenke

Additional bibliography: G. Taylor, Ind. Kew. Suppl. 12: 27. 1959; Moldenke, Phytologia 14: 146—147. 1966.

CALLICARPA CUBENSIS Urb.

Additional bibliography: Moldenke, Phytologia 16: 363 (1968) and 21: 215 & 233. 1971.

Additional citations: CUBA: Havana: Sagra s.n. (N—isotype).

CALLICARPA CUBENSIS var. PARVIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 14: 154—155. 1966.

This variety has been collected near brooks, flowering in March, and fruiting in November.

The Cuesta 1017 [as "Anesta"] and Eman 11909 & 17930, cited below, were previously cited by me (1940) as anomalous specimens

of C. shaferi Britton & P. Wils., which I now feel that they are not.

Additional citations: CUBA: Pinar del Río: Acuña & Roig 16765 (Ha—istype, N—istype); Cuesta 1017 (N); Ekman 17930 (B, N, N—photo, S, Z—photo). ISLA DE PINOS: Ekman 11909 (B, S, Z—photo).

CALLICARPA DICHOTOMA (Lour.) K. Koch

Additional synonymy: Callicarpa dichotoma Juss., in herb.

Additional bibliography: T. H. Everett, Read. Dig. Compl. Book Gard. 420. 1966; Moldenke, Phytologia 21: 152 & 242. 1971.

Dop (1932) states that C. petelotii Dop resembles C. dichotoma and C. brevipes (Benth.) Hance in its glabrous ovary, its glabrous branches and leaves, and the very numerous glands on the leaf-blades and that it may possible represent a natural hybrid between C. longifolia Lam. and/or C. dichotoma and C. brevipes.

The C. O. Levine s.n. [Herb. Canton Chr. Coll. 743], distributed as C. dichotoma, is actually C. randaiensis Hayata.

CALLICARPA DICHOTOMA f. **ALBIFRUCTA** Moldenke

Additional bibliography: Moldenke, Phytologia 14: 170 (1966) and 21: 152. 1971.

Additional citations: CULTIVATED: Japan: Togasi 1667 (Go—istype).

CALLICARPA DOLICHOPHYLLA Merr.

Additional synonymy: Callicarpa caudata var. γ H. J. Lam, Verbenac. Malay. Arch. 61. 1919.

Additional & emended bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 12: 108, 301, & 382. 1917; Moldenke, Phytologia 21: 36, 104, 107, 108, 212, & 213. 1971.

CALLICARPA ERIOCLONA Schau.

Additional bibliography: Elm., Leaf1. Philip. Bot. 10: 3860. 1939; Kaneh. & Hatus., Bot. Mag. Tokyo 56: 113. 1942; Moldenke, Phytologia 21: 151, 152, 215, & 223. 1971.

CALLICARPA ERYTHROSTICTA Merr. & Chun

Additional bibliography: E. J. Salisb., Ind. Kew. Suppl. 11: 40. 1953; Moldenke, Phytologia 21: 37. 1971.

CALLICARPA FERRUGINEA Sw.

Additional bibliography: Ainslie, Mat. Ind. 2: 181. 1826; Moldenke, Phytologia 21: 152—153. 1971.

CALLICARPA FORMOSANA Rolfe

Additional & emended bibliography: Elm., Leaf1. Philip. Bot. 6: 1926 & 2090. 1913; E. D. Merr., Philip. Journ. Sci. Bot. 12: 382. 1917; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.] 603. 1927; Elm., Leaf1. Philip. Bot. 9: 3135 (1934) and 10: 3860. 1939; Moldenke, Phytologia 21: 153, 164, & 236. 1971.

Emended illustrations: T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.] 603. 1927.

CALLICARPA FORMOSANA f. *ANGUSTATA* Moldenke

Additional bibliography: Moldenke, *Phytologia* 21: 36, 37, & 236. 1971.

The R. S. Williams 1158 collection, cited below, was erroneously cited by me in *Phytologia* 14: 143 (1966) as *C. caudata* Maxim.

Additional citations: PHILIPPINE ISLANDS: Luzon: R. S. Williams 1158 (N).

CALLICARPA FORMOSANA var. *GLABRESCENS* Moldenke

Additional bibliography: Moldenke, *Phytologia* 15: 26 (1967) and 21: 108. 1971.

The Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49011], so listed by me in a previous publication, proves actually to be *C. phanerophlebia* Merr., while W. T. Tsang 850 [Herb. Lingnan Univ. 16349] is a cotype collection of *C. rubella* f. *robusta* P'ei.

CALLICARPA JAPONICA Thunb.

Additional & emended bibliography: Makins, *Ident. Trees & Shrubs* 74 & 258, fig. 62 G. 1936; Hara, *Enum. Sperm. Jap.* 1: 183 & 185. 1948; Li, *Morris Arb. Bull.* 14: 4-7, fig. 1-6. 1963; T. H. Everett, *Read. Dig. Compl. Book Gard.* 420. 1966; Moldenke, *Phytologia* 21: 154, 210, 212, & 240-242. 1971.

Additional illustrations: Makins, *Ident. Trees & Shrubs* 74, fig. 62 G. 1936.

CALLICARPA JAPONICA var. *LUXURIANS* Rehd.

Additional & emended bibliography: Nakai in Nakai & Koidz., *Trees & Shrubs Indig. Jap.*, ed. 2, 1: 454-455, 463, & 464, fig. 215 & 220. 1927; Hatus., *Journ. Jap. Bot.* 26: 372. 1951; Ohwi, *Fl. Jap.* 763, 764, & 998. 1965; Moldenke, *Phytologia* 20: 495 (1971) and 21: 35, 41, 44-45, 49, 102, & 103. 1971.

Additional & emended illustrations: Nakai in Nakai & Koidz., *Trees & Shrubs Indig. Jap.*, ed. 2, 1: 454, fig. 215 & 220. 1927; Nakai in Shirasawa, *Icon. Essenc. Forest. Jap.* 2: [Terasaki, *Zoku Nipp. Syokubutshu*] fig. 2481. 1938.

CALLICARPA LINGII Merr.

Additional bibliography: A. W. Hill, *Ind. Kew. Suppl.* 8: 37. 1933; Moldenke, *Phytologia* 21: 47. 1971.

CALLICARPA LONGIFOLIA Lam.

Additional synonymy: *Callicarpa longifolia* var. *subglobata* Schau. ex Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 113, sphalm. 1942.

Additional & emended bibliography: Benth. in Hook., *Journ. Bot. & Kew Gard. Misc.* 5: 136. 1853; H. N. Ridl., *Journ. Straits Med. Assoc.* 5: 127. 1897; Ahmad, *Agric. Bull. Straits & Fed. Malay States* 6: 162. 1907; E. D. Merr., *Philip. Journ. Sci. Bot.*

12: 108 & 382. 1917; Nakai, Bot. Mag. Tokyo 36: 23. 1922; Janson., Mikrogr. Holzes Java 4: 774. 1928; Burkill & Haniff, Gard. Bull. Straits Settl. 6: 233. 1930; Gimlette & Burkill, Gard. Bull. Straits Settl. 6: 354, 387, 388, & 394. 1930; Elm., Leaflet. Philip. Bot. 10: 3860. 1939; Hatus., Journ. Jap. Bot. 24: 81. 1949; Burkill, Dict. Econ. Prod. Malay Peninsula. 1: 407-408. 1966; Corner & Watanabe, Illustr. Guide Trop. Pl. 752. 1969; Vidal & Lemoine, Journ. Agr. Trop. & Bot. Appl. 17: 28-29. 1970; Moldenke, Phytologia 21: 155-162, 164, 210-215, 223-225, 234, & 235. 1971.

Additional illustrations: Corner & Watanabe, Illustr. Guide Trop. Pl. 752. 1969.

Vidal & Lemoine (1970) record the common name "ntoo peeb lab soob" for this plant, cite Lemoine 24 & 106 from Laos, and comment that it is an "Arbre de forêt claire ou de forêt secondaire à fruits charnus violets, non comestibles. Les feuilles sont appliquées sur les blessures".

Burkill (1966) lists the following vernacular names for this plant: "tampang bēsi" ("tulang bēsi" is an error for this), "tampang bēsi puteh" (=white-fruited tampang bēsi), "tampung bēsi", "tampoh bēsi", "tampah bēsi", "tampal bēsi", "tapah bēsi", "sulap", "karat bēsi", "chapal", "chapul kēchil", "nasi-nasi"; in Java "mēniran utan", "mēniran sapi", "gambiran", "songka", "songka kampong"; in Sundanese "katumpang"; in Sumatra "sētampo", "bēbētih kinana"; in Bangka "nasi-nasi"; in Thailand "khow tok". He notes, further, that the plant is "A shrub found throughout Malaysia and to Australia; in the Peninsula it is common. It is one of the chief plants used for poulticing by the Malays, and is also administered internally. For colic a decoction of the leaves is drunk.....This use extends to Java and through to the Moluccas. A similar decoction is given after childbirth, and for fever. For syphilis an infusion of the root is used.....and Rumpf says a decoction of the roots is useful for diarrhoea. The 'Medical Book of Malayan Medicine'.....seems to put this into the first place as a means of treating sprue, prescribing, as a draught, an infusion of the root, a gargle prepared by infusion of the leaves, and a mouth-wash prepared by infusing the bark. A decoction of the root of some species of Callicarpa, such as this, is prescribed,....for distension of the stomach, the treatment comprising bathing the body by a decoction of the leaves. The leaves are used by the Malays for poulticing in fever, and for rubbing over the body and are applied to swellings. A lotion containing the juice of the root is used for nasal caries....The leaves are said to stupefy fish....The wood burns steadily and thoroughly, whence the common Javanese name; it will not make charcoal. Jansonnus has described the minute structure...."

Dop (1932) states that C. longifolia is similar to C. petalotii Dop in the form of its leaves and the dimensions and disposition of the cymes and that the latter may possibly represent a natural hybrid between C. longifolia and C. dichotoma (Lour.) K. Koch and/or C. brevipes (Benth.) Hance.

CALLICARPA LONGIPETIOLATA Merr.

Additional bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 12: 299--300. 1917; Moldenke, Phytologia 21: 208--210. 1971.

Merrill (1917) states that C. subintegra Merr. is allied to C. longipetiolata "from which it is at once distinguished by its differently shaped, narrow, caudate-acuminate leaves".

CALLICARPA LONGISSIMA (Hemsl.) Merr.

Additional & emended bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 12: 108 & 382. 1917; Hatus., Journ. Jap. Bot. 24: 81. 1949; Moldenke, Phytologia 21: 210--214. 1971.

CALLICARPA MACROPHYLLA Vahl

Additional & emended bibliography: Dennst., Schlüss. Hort. Malab. 16 & 30. 1818; Ainslie, Mat. Ind. 2: 181. 1826; Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; Boddington, Mem. Asiat. Soc. Beng. 10: 245. 1927; Jain & Tarafdar, Econ. Bot. 24: 247. 1970; Farnsworth, Pharmacog. Titles 6 (1): iii & item 1370. 1971; Moldenke, Phytologia 21: 214--227. 1971.

CALLICARPA MAINGAYI King & Gamble

Additional synonymy: Callicarpa lanata Ridl. ex Burkill, Dict. Econ. Prod. Malay Penins. 1: 408, in syn. 1966 [not C. lanata Gamble, 1893, nor Hosséus, 1912, nor "L. sensu Gamble", 1971, nor L., 1767, nor H. J. Lam, 1940, nor Lam., 1821, nor Roxb., 1966, nor Schau., 1870, nor Vahl, 1847, nor Wall., 1883, nor Walp., 1921, nor Zipp., 1841].

Additional bibliography: H. N. Ridl., Journ. Roy. Asiat. Soc. Straits Br. 30: 79. 1897; Elm., Leaflet. Philip. Bot. 10: 3860. 1939; Burkill, Dict. Econ. Prod. Malay Penins. 1: 408. 1966; Moldenke, Phytologia 21: 229--231. 1971.

The C. lanata accredited to Gamble, referred to in the synonymy above, is actually a synonym of C. vestita Wall., that credited to Hosséus is C. arborea Roxb., that credited to H. J. Lam is C. arborea var. psilocalyx (H. J. Lam) Moldenke, that credited to Lamarck is Premna tomentosa Willd., that credited to Schauer, to Vahl, to Walpers, and to Zippelius is C. pedunculata R. Br., and that credited to Linnaeus, to "Linnaeus sensu Gamble", to Wallich, and to Roxburgh belongs in the synonymy of C. tomentosa (L.) Murr.

Burkill (1966) refers to C. maingayi as follows: "A tree, confined to the Malay Peninsula, in Pahang, Selangor, and Malacca. Alvins says that the wood can be used for making fiddles, adding that there are two kinds of it, one with red and one with white bark. The bark on the younger branches is rusty red. Alvins says that the bark is used as a substitute for betel." He lists the common names "tampang besi", "mendapor", "tutok puteh" ["tulo" and "tutor" are errors for this], "chulak", "balek angin laut" [in reference to the white color of the lower leaf-surface].

CALLICARPA MERRILLII Moldenke

Additional bibliography: E. D. Merr., Philip. Journ. Sci. 30:

87. 1926; Moldenke, Phytologia 21: 233—235. 1971.

CALLICARPA MOLLIS Sieb. & Zucc., Abh. Akad. Muench. 4 (3) [Fl. Jap. Fam. Nat. 2]: 155—156. 1846.

Additional & amended bibliography: Sieb. & Zucc., Abh. Akad. Muench. 4 (3) [Fl. Jap. Fam. Nat. 2]: 155—156. 1846; Nakai, Journ. Jap. Bot. 14: 641. 1938; Moldenke, Phytologia 21: 237—242. 1971.

This binomial is sometimes erroneously cited to "Sieb. & Zucc., Fl. Jap. Fam. Nat. 526. 1846" — "526" is the species (not page) number in this work.

Additional citations: JAPAN: Honshu: Furuse s.n. [13 Oct. 1957] (S); Herb. Mus. Bot. Stockholm s.n. [Musasi, 1/10/1911] (S, S); Hiroe 7184 (Ca—939530); Hurusawa 34a (W—2073730); Inokuma 11 (Bi), 68 (Bi); Kinashi s.n. [Kyoto, 8.VI.1921] (Mi); Kitamura s.n. [Hondo, 28.VI.1931] (Mi, Mi); Kobayashi 13617 (S), 13938 (S), 15903 (Go); Maruyama & Okamoto 1617 (Go, N, S, Se—199277, W—2335110, Ws); Y. Matsumura 1669 (N), 4951 (N), 6673 (N); Maximowicz s.n. [Yokohama, 1862] (Bz—18100, S, T, W—9974, W—2496751); Mizushima 2927 (S), 3121 (S), 17169 (S); Murata 16428 (W—2409699); Okamoto 37 (Ws); S. Suzuki SI.55 (W—2214941), UC.93 [Herb. Suzuki 369002] (Ca—793587), UC.754 [Herb. Suzuki 437010] (Ca—930479), UC.784 [Herb. Suzuki 440027] (Ca—930516), UC.990 [Herb. Suzuki 463017] (Ca—953861), s.n. [Jun. 26, 1951] (Se—138339), s.n. [Jul. 10, 1951] (Se—138257), s.n. [Oct. 27, 1951] (Se—149640); Tagawa 195 (Ws); Thörn 25 (Go); Togasi 379 (Ca—955797, Go, Mg, Mi, N, S, S, Se—147223, Vi, W—2242153), 1255 (B, Ca—87159, Go, Mg, N, S, Se—177804, W—2276612, Ws, Ws); K. Uno 18448 (Ba), 18450 (N); Yamada s.n. [Ise, 20 juin 1910] (W—1178282). Kyushu: Herb. Sci. Coll. Imp. Univ. s.n. [July] (Vt); Hurusawa 34b (W—2073731); Kanahira s.n. [Mt. Seburi, Jun. 9, 1929] (W—1529231); Masamune s.n. [Satsuma, May 20, 1923] (N); Maximowicz s.n. [Nagasaki, 1863] (C); Oldham 620 (M, T), 621 (S); S. Suzuki 791 (Ws); Takenouchi s.n. [Ruzen, 7.X.1933] (Gg—267590). Miyajima: Hiroe 12036 (Ca—40384), 19038 (Ca—40399). Shikoku: Collector undetermined s.n. [Nanokawa, Tosa, June 21, 1892] (W—206169); Murata & Shimizu 1170 (Ws); Tagawa s.n. [Aug. 9, 1930] (Ws); Uyeki 74 (Vi); Watanabe s.n. [Takeyashiki, June 13, 1887] (Ca—363663); Yamozaki 34 (W—2073857). Sugashima: Kitamura s.n. [11 Nov. 1951] (Mi). Tsushima: Ohashi & Sobma 10017 (W—2594172); Wilford s.n. [1859] (S). Island undetermined: Herb. LeRoy s.n. (N); Herb. Lugd. Batav. s.n. (S); Herb. Umbach 22313 [Kogashiyama] (Ws); Siebold s.n. (M); Simada s.n. [Japan] (W—9964, W—9973); C. Wright s.n. [Simoda] (N—photo, N—photo, Os, T, Z—photo); Zollinger 350 (S). CULTIVATED: Java: Herb. Bogor. 18099 (Bz).

CALLICARPA MOLLIS var. *MICROPHYLLA* Sieb. & Zucc., Abh. Math.-phys. Kl. Kongl. Baierisch. Akad. Wiss. Muench. 4 (3): 156 [as "*microphylla*"]. 1846.

Synonymy: *Callicarpa japonica* var. *microphylla* Sieb. & Zucc. ex Moldenke, Résumé 172 & 444. 1959.

Bibliography: Sieb. & Zucc., Abh. Math.-phys. Kl. Kongl. Baierisch. Akad. Wiss. Muench. 4 (3) [Fl. Jap. Fam. Nat. 2]: 156. 1846; Sieb. & Zucc., Fl. Jap. Fam. Nat. Alt. 156. 1846; Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 99. 1865; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; Nakai, Trees & Shrubs Indig. Jap., ed. 1, 338. 1922; Nakai, Fl. Sylv. Kor. 14: 32--33 & 133. 1923; Nakai in Nakai & Koidz., Trees & Shrubs Indig. Japan, ed. 2, 1: 458. 1927; Masam., Prel. Rep. Veg. Yak. 115. 1929; Masam., Fl. & Geo. Yakus. 387. 1934; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Hara, Enum. Sperm. Jap. 1: 185. 1948; Moldenke, Phytologia 3: 295. 1950; Masam., Sci. Rep. Kamazawa Univ. 4: 46. 1955; Hara, Distrib. Maps Flow. Pl. Jap. 51. 1958; Moldenke, Résumé 172 & 444. 1959; Moldenke, Résumé Suppl. 15: 11 (1967) and 16: 17. 1968; Moldenke, Phytologia 21: 242. 1971.

The original description (1846) of this variety is "foliis lanceolatis vel ovato-lanceolatis acuminatis basi rotundatis dense et aequaliter serrulatis pollicaribus vel bipollicaribus. Die Behaarung und allgemeine Form der Blätter stimmt mit der *mollis* überein, nur sind dieselben viel kleiner und am Rande mit Ausnahme der Basis und Spitze gleichmässig feinsägezählig. Die Blüten sind an unseren Exemplaren nicht vollständig entwickelt." Nakai (1923) describes it as "Frutex 1—1.5 metralis ramosissimus. Folia 1—3 cm. longa. Nom. Jap. Kobano-yabumurasaki. Hab. in insula Hokitsutō. Distrib. Kiusiu." Masamune (1929, 1955) records it from Honshu and Kyushu, Japan, as well as from Yakushima in the Ryukiu Islands, and records the vernacular name "bagabayabu-murasaki".

According to Hara (1948) the "*C. mollis* var. *microphylla* Sieb. & Zucc." of Nakai (1922, 1923) is really *C. mollis* var. *ramosissima* Nakai.

It should be noted that Siebold & Zuccarini's reprint publication (1846) is often cited as "Fl. Jap. Fam. Nat. 2: 156" and Masamune's 1934 publication as "Masam. FY. 387". Miquel (1870) cites Siebold 3 [specimens?], Keiske 1 [specimen?], and Mohnike 1 [specimen?].

In some of my previous publications I did not accept the validity of this variety and reduced it to synonymy under typical *C. mollis* Sieb. & Zucc. However, recent Japanese workers, with field experience, regard it as a valid taxon and so I bow to their judgement. As yet I have seen no herbarium material of it.

CALLICARPA MOLLIS var. *RAMOSISSIMA* Nakai in Nakai & Koidz., Trees & Shrubs Indig. Jap., ed. 2, 1: 458. 1927.

Synonymy: *Callicarpa japonica* var. *ramosissima* Nakai ex Moldenke, Résumé 172 & 444. 1959.

Bibliography: Nakai, Trees & Shrubs Indig. Jap., ed. 1, 338.

1922; Nakai, Fl. Sylv. Kor. 14: 32. 1923; Nakai in Nakai & Koidz., Trees & Shrubs Indig. Jap., ed. 2, 1: 458. 1927; Masam., Prel. Rep. Veg. Yak. 115. 1929; Masam., Fl. & Geo. Yakus. 387. 1934; Hara, Enum. SpERM. Jap. 1: 185. 1948; Moldenke, Phytologia 3: 295. 1950; Masam., Sci. Rep. Kanazawa Univ. 4: 46. 1955; Moldenke, Résumé 172 & 444. 1959; Moldenke, Résumé Suppl. 15: 11 (1967) and 16: 17. 1968.

According to Hara (1948) this taxon was erroneously reported as C. mollis var. microphylla Sieb. & Zucc. by Nakai in 1922 and 1923. He cites an illustration ["f. 2483 (1938)"], but unfortunately gives the name of the publication and its author only in Japanese characters.

Masamune (1955) records var. ramosissima from Honshu, Kyushu, and Sikoku, Japan, as well as from Yakushima in the Ryukiu Islands, and gives the vernacular name "kobano-yabumurasaki".

As yet I have seen no herbarium material of this taxon.

CALLICARPA NIGRESCENS Merr., Philip. Journ. Sci. 30: 425—426. 1926.

Bibliography: E. D. Merr., Philip. Journ. Sci. 30: 425—426. 1926; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 177. 1949; Moldenke, Phytologia 4: 124. 1952; Moldenke, Résumé 183, 198, & 444. 1959; Moldenke, Résumé Suppl. 15: 11. 1967; Moldenke, Phytologia 21: 109. 1971.

Merrill (1926) describes this plant as follows: "A shrub about 2 m high, the branches terete, older ones glabrous, the branchlets slender, densely and minutely stellate-furfuraceous or stellate-sublepidote, the indumentum brown or pale. Leaves opposite, membranaceous or subchartaceous, oblong to broadly oblong-lanceolate, 6 to 15 cm long, 3 to 6 cm wide, slenderly and sharply almost caudate-acuminate, base acute or decurrent-acuminate, margins crenate or crenate-dentate, the upper surface dark brown to black and shining when dry, entirely glabrous or with scattered stellate hairs when immature, the lower surface paler than the upper, minutely and rather densely pitted and with numerous shining glands, the indumentum of short, pale, stellate, scattered hairs, for the most part confined to the midrib and lateral nerves; lateral nerves about 7 on each side of the midrib, slender, curved-ascending, distinct; petioles 1 to 3 cm long, minutely and rather densely stellate-pubescent. Cymes axillary, mostly densely flowered, about as long as the petioles, the peduncles, branches, and calyces densely and minutely stellate-pubescent with pale or brownish hairs, the pedicels about 1.5 mm long, the bracteoles linear, 0.5 mm long. Calyx truncate, about 2 mm long, 1.5 mm in diameter, narrowed below to the cuneate base. Corolla tube 2 mm long, glabrous, the lobes 4, oblong-elliptic, rounded, glabrous or very slightly pubescent above, about 1.5 mm long. Filaments glabrous, 4 to 4.5 mm long; anthers oblong, 1.3 mm long. Style exerted, glabrous, 7 mm long. Fruit globose, glabrous, black when dry, about 2 mm in

diameter."

The type of the species was collected by Maximo Ramos and Gregorio E. Edaña [Philip. Bur. Sci. 44297] in secondary forests at low altitudes on Tawitawi, Sulu Archipelago, Philippine Islands, in August, 1924, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, now unfortunately destroyed. Merrill cites also Philip. Bur. Sci. 44198, gathered by the same collector at the type locality in July of 1924. He comments that this is "A species rather well characterized within the genus by its very short indumentum, which is dense on the branchlets and inflorescences, and wanting or very sparse on the vegetative parts. The leaves are characteristically black or dark colored on the upper surface when dry, as in Callicarpa cana Linn. and C. bicolor Juss., and the species is apparently allied to these in spite of the difference in indumentum. According to Bakhuizen's arrangement of the species, it would apparently fall near or with Callicarpa japonica Thunb. and C. longifolia Lam., to neither of which can it be properly referred. I doubt very much if any of the Philippine or Malaysian material is properly referable to Thunberg's species."

Recent collectors describe this plant as 2 m. tall, the stems 3 cm. in diameter, the corollas bluish-pink, stamens yellow, and fruit green (in August), growing in secondary forests at low altitudes.

In all, 7 herbarium specimens, including material of the type collection, have been examined by me.

Citations: PHILIPPINE ISLANDS: Sulu: Wilkes Exped. s.n. [Sulu Archipelago] (W—40650). Tawitawi: Ramos & Edaña s.n. [Herb. Philip. Bur. Sci. 44198] (B, Bz—17292, Ca—25733L, N), s.n. [Herb. Philip. Bur. Sci. 44297] (N—isotype). MOLUCCA ISLANDS: Sanana: Bloembergen 4336 (Bz—18056).

CALLICARPA NIPENSIS Britton & P. Wils. in N. L. Britton, Mem. Torrey Bot. Club 16: 98. 1920.

Synonymy: Callicarpa nipense Britton & P. Wils. ex Moldenke, Alph. List Cit. 1: 187, sphalm. 1946.

Bibliography: N. L. Britton, Mem. Torrey Bot. Club 16: 98. 1920; J. A. Clark, Card Ind. Gen. Sp. Pl. 1920; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke in Fedde, Repert. Spec. Nov. 39: 298 (1936) and 40: 56, 73—80, 119, 123, & 129. 1936; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87. 1942; Moldenke, Alph. List Cit. 1: 187 & 312 (1946) and 3: 929. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 307. 1957; Moldenke, Résumé 50 & 444. 1959; Moldenke, Phytologia 14: 155. 1966.

The Alain & Lopez Figueiras 4848, distributed as C. nipensis, is actually C. cuneifolia Britton & P. Wils.

In all, 5 herbarium specimens, including the type, and 5 mounted photographs of this species have been examined by me.

Emended citations: CUBA: Oriente: Shafer 3026 (F—286168—isotype).

CALLICARPA NUDIFLORA Hook. & Arn., Bot. Beech. Voy. 206, pl. 46. 1836.

Synonymy: Callicarpa acuminata Roxb., Hort. Beng. [10], hyponym. 1814; Fl. Ind., ed. 1 [Carey & Wall.], 1: 408—409. 1820 [not C. acuminata Humb., 1825, nor Humb. & Bonpl., 1821, nor H.B.K., 1817, nor Humb. & Kunth, 1839, nor Kunth, 1847]. Callicarpa reevesii Wall., Numer. List 50, hyponym. 1829. Callicarpa nudiflora Hook. ex Pritz., Icon. Bot. Ind. 1: 188. 1866. Callicarpa macrophylla var. sinensis C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885. Callicarpa reevesii Wall. ex Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166, sphalm. 1895. Callicarpa reevesii Wall. apud Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 22, sphalm. 1921. Callicarpa acuminata var. angustifolia Metc., Lingn. Sci. Journ. 11: 407. 1932. Callicarpa reevesii Wall. apud P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 19, sphalm. 1932. Callicarpa reevesii Wall. ex Moldenke, Résumé 246, in syn. 1959. Callicarpa macrophylla var. acuminata (Roxb.) Bakh., in herb. Callicarpa reversii Wall., in herb.

Bibliography: Roxb., Hort. Beng. [10]. 1814; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 408—409 & 481. 1820; Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825; J. A. & J. H. Schultes, Mant. 3: 53. 1827; Spreng. in L., Syst. Veg., ed. 16, 5: 126. 1828; Wall., Numer. List 50. 1829; Roxb., Fl. Ind., ed. 2 [Carey], 1: 394 & 395. 1832; Hook. & Arn., Bot. Beech. Voy. 206, pl. 46. 1836; Boj., Hort. Maurit. 258. 1837; D. Dietr., Syn. Fl. 1: 428. 1839; Steud., Nom. Bot., ed. 2, 1: 257. 1840; Walp., Nov. Act. Nat. Cur. 19, Suppl. 1: 381. 1843; Walp., Repert. Bot. Syst. 4: 125—126. 1845; Schau. in A. DC., Prodr. 11: 641 & 642. 1847; Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; Miq., Fl. Ned. Ind. 2: 888. 1856; Benth., Fl. Hongk. 270. 1861; Pritz., Icon. Bot. Ind. 1: 188. 1866; Roxb., Fl. Ind., ed. 3 [C. B. Clarke], 132. 1874; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 568. 1885; Maxim., Bull. Acad. Sci. St. Pétersb. 31: 75. 1886; Maxim., Mém. Biol. 12: 504 & 505. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 254—255. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; H. N. Ridl., Journ. Roy. Asiat. Soc. Straits 33: [Fl. Singap.] 122. 1900; King & Gamble, Journ. Roy. Asiat. Soc. Beng. 74 (2), extra no., 802 & 805—806. 1908; King & Gamble, Mat. Fl. Malay. Penins. 21: 1012 & 1015—1016. 1909; Dunn & Tutchner, Kew Bull. Misc. Inf. Addit. Ser. 10: 202. 1912; H. J. Lam, Verbenac. Malay. Arch. 48, 65, & 89. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 10 & 22. 1921; H. N. Ridl., Fl. Malay Penins. 2: 617. 1923; Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; E. D. Merr., Lingn. Sci. Journ. 5: 157. 1927; Stapf, Ind. Lond. 1: 526. 1929; Moldenke,

Bull. Torrey Bot. Club 60: 55--56. 1932; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 503, 511, & 512. 1932; Metc., Lingn. Sci. Journ. 11: 407. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 14, 16, 19, & 42--44. 1932; H. F. MacMillan, Trop. Plant. & Gard., ed. 4, 104. 1935; L. H. Bailey, List Florists Handl. Verbenac. mss. 1935; Moldenke in Fedde, Repert. Spec. Nov. 39: 302 (1936) and 40: 39, 41, 106, 113--115, 120--122, 124, 127, & 128. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Geogr. Distrib. Avicenn. 36. 1939; Moldenke, Prelim. Alph. List Invalid Names 9 & 12. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 54--56, 58, 59, 61, 71, & 87. 1942; Moldenke, Alph. List Invalid Names 8 & 10. 1942; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 1, 104. 1943; Moldenke, Phytologia 2: 85 & 95. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 2, 104. 1946; Moldenke, Alph. List Cit. 1: 21, 89, 91, 108, 271, & 298. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 3. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 78. 1948; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 3, 104. 1948; Moldenke, Alph. List Cit. 2: 359, 402, 404, 410, 432, 580, 643, & 644 (1948), 3: 657, 658, 666, 770, 775, & 854 (1949), and 4: 1011, 1105, 1228, 1234, & 1297. 1949; Moldenke, Phytologia 3: 139. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 124, 125, 128, 129, 131, 134--136, 139, 157, & 177. 1949; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 4, 104. 1949; Moldenke, Revist. Sudam. Bot. 8: 172. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 279, 283, 307, 308, & 311. 1951; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 5, 104. 1952; Moldenke, Phytologia 4: 124 (1952) and 4: 268. 1953; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 6, 104 (1954) and pr. 7, 104. 1956; Moldenke, Résumé 159, 160, 165, 166, 168, 173--175, 179, 214, 241, 245, 246, & 444. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; H. F. MacMillan, Trop. Plant. & Gard., ed. 5, pr. 8, 104. 1962; Sen & Naskar, Bull. Bot. Surv. India 7: 38. 1965; Moldenke, Phytologia 13: 431 & 433 (1966) and 14: 38, 112, 114, 121, & 142. 1966; Burkill, Dict. Econ. Prod. Malay Penins. 1: 407. 1966; Moldenke, Résumé Suppl. 14: 3 & 4 (1966) and 15: 16. 1967; Tingle, Check List Hong Kong Fl. 38. 1967; Moldenke, Phytologia 14: 219 & 225 (1967) and 16: 384 & 447. 1968; Chan & Teo, Chem. Pharm. Bull. Tokyo 17: 1284--1286. 1969; Farnsworth, Pharmacog. Titles 5 (4): iii & item 4115. 1970; Moldenke, Phytologia 21: 35, 101, 114, 151, 223, & 225. 1971.

Illustrations: Hook. & Arn., Bot. Beech. Voy. pl. 46. 1836.

As has been pointed out by me in 1932, the Asiatic plant for so long a time known as C. acuminata Roxb. must take on another name. While this binomial was actually first proposed by Roxburgh in 1814, it was not accompanied by any description. It was, therefore, a mere hyponym, and is not considered to have been validly published at that time. A full description, validating the name, was not published by him until 1820. In the meantime, Humboldt, Bonpland, & Kunth published their C. acuminata in quite va-

lid form for a Mexican, Central and South American species in 1817 with a full description. The Asiatic and American plants are similar in appearance, but are not conspecific. The American plant, therefore, must retain the name C. acuminata H.B.K. and the Asiatic plant must take on a new name.

The second oldest name for the Asiatic plant is C. reevesii Wall., proposed in 1829, but also as a hyponym. It was not validly published until by Walpers in 1845. In 1836, however, Hooker & Arnott published C. nudiflora, accompanied by a good description and illustration. It seems obvious, therefore, that the Asiatic plant first known as C. acuminata Roxb., then as C. reevesii Wall., must now be known as C. nudiflora Hook. & Arn. It has been collected rather extensively in southern China, Canton, Kwangtung, Hainan Island, Macao, and Lappas Island, and occurs also in Silhet, Tenasserim, and Singapore.

Roxburgh's original (1820) description of his C. acuminata is "Shrubby, tender parts hoary with a stellate pubescence. Leaves broad-lanceolar, acuminate, remotely repand, denticulate. Panicles axillary, long peduncled, dichotomous, shorter than the leaves. A native of Silhet, flowers in May. In this species the panicles are elevated on longer peduncles than in the other species [of India], the leaves and young parts very hairy, except the upper surface of the former when fully expanded, which is then naked and reticulate; from four to five inches long by nearly two broad."

King & Gamble (1908) amplified this description as follows: "A shrub, the branches, petioles, the under surface of leaves, and inflorescence covered with a soft, whitish-grey or pale tawny, mealy tomentum of branched or stellate hairs. Leaves coriaceous; lanceolate or elliptic-lanceolate, long acute at apex, attenuate at base and often slightly unequal, not decurrent; upper surface dark when dry, glabrous except the nerves, lower tomentose; margins entire for the lower third, above that shortly dentate serrate; 5 to 8 in. long, 2 to 3 in. broad; midrib stout; main nerves 13 to 15 pairs, nearly regular, starting at an angle of 45° to 60° with the midrib and curving gently to the margin, each pair joined by rather obscure transverse nervelets, all slightly impressed above; petiole .75 in. long. Cymes axillary, rounded, many-flowered, widely dichotomous, reaching 4 in. long and about 3 in. broad; peduncles 1.5 to 2 in. long; bracts linear subulate, 1 in. long; pedicels short, slender, nearly glabrous, .05 to .1 in. long; flowers purple? Calyx very short, nearly glabrous but with a few stellate hairs and minutely glandular-punctate, very shortly 4-toothed. Corolla twice as long as calyx .1 in.; lobes rounded, sparsely stellate-pubescent and glandular-punctate. Stamens long exsert; filaments slender; anthers small; the connective glandular-punctate. Ovary rounded, very glandular; style very long, twisted; stigma peltate, large. Drupe purple, small, .075 to .1 in. in diam., nearly globose; pyrenes 4.....Singapore: near the Botanic Gardens, Murton 87; Ridley 6884 cult! Distrib. Tenasserim (?) (Falconer); Southern China."

Bakhuizen van den Brink (1921) gives the distribution of this species as "S.-China! Canton! Lappas-Isl.! Kwantung! Hongkong! Hainan! Macao! Silhet! ? Tenasserim!? Singapore!"

Recent collectors describe the plant as a low woody shrub, 1--3 m. tall, or sometimes a small to large tree, to 9 m. tall, erect, the stems 15--25 cm. in diameter, bark brown and flaky, branches pale furfuraceous, becoming gray-green, the leaves "yellow-green" or green, pale- or deep-green above, pale-green or grayish mealy-tomentose beneath (or "light-green above, tawny beneath"), "with prominent glaucous vein" beneath, the flowers fragrant or ill-smelling, the stamens purple, the immature fruit green, maturing to red (Chun & Tso 44714, Tsang s.n., Wang 35446), lilac (Chun 6846), purple-red (Liang 63254), purple, or blue; "green to white" on Liang 66369 and "brown" on Chun 40422 & Lei 125. The corolla is described as being "red" on W. T. Tsang 29, "pink" on Fung 20276, Liang 62117, and Taam 1560, "rose" on Bodinier 798, "pale pink-purple" on Clemens & Clemens 3148, "peach-red" on Lei 914, "purple-pink" on Clemens & Clemens 3936, "violet" on Chun 3155, "purple" on Chun 2108, Tsang & Fung 461, and Wang 32788, and "white" on Ying 872.

Collectors have found the plant growing in loam soil or sand, in open thickets, mixed woods, forests, and gardens, on level land, slopes, open hillsides, rocky mountains, and forest margins, along open roadsides and streamsides, and in partial shade at the sides of ravines, at altitudes of 1200 feet, flowering in February and from April to September, fruiting from August to February. Tsang describes it as "abundant scattered shrubs in dry sandy soil", Lau says "fairly common, dry cliffs, sandy soil", and Lei reports "rare in loam of dry level land", "scattered shrubs in village greens", and "in roadside gardens". Bodinier reports it as "rare dans l'île" on Hongkong, while Chun found it to be "common" on Hainan Island.

It should be noted that Sprengel (1825) places Roxburgh's C. acuminata in the synonymy of C. heynei Roth [now known as C. candicans (Burm. f.) Hochr.]. The Hooker & Arnott 1836 reference in the bibliography of C. nudiflora is dated "1841" by Bakhuizen van den Brink (1921), Stapf (1929), and P'ei (1932), but actually was published in 1836 [see the dates of publication of the various pages of this work, as well as of the plates, under C. kochiana in these notes]. The Wallich 1829 reference is cited as "1828" by Bakhuizen van den Brink, who also cites the 1845 Walpers reference by the title-page date of "1844--1848". The King & Gamble publications, referred to above, are both often cited as "1909" and the pages reversed or the serial citation given as "74 (4)". Dr. Lam (1919) reduces Roxburgh's C. acuminata to synonymy under C. longifolia f. floccosa Schau.

The Callicarpa acuminata var. angustifolia of Metcalf (1932) seems to be merely a new name for C. nudiflora Hook. & Arn. as distinguished by him from C. acuminata Roxb. and C. reevesii Wall.

He cites for it a Ford s.n., originally determined as C. purpurea A. L. Juss. in the Arnold Arboretum herbarium. Callicarpa macrophylla var. sinensis C. B. Clarke is described by Clarke (1885) as having "Leaves oblong-lanceolate, closely denticulate, peduncles longer than the petioles, anthers oblong, larger. -- Canara; Gibson. Calcutta; Distrib. China. Branches upwards dense with leaves. Teeth of the leaves with minute black glandular spots. Calyx in flower stellately tomentose, soon nearly glabrate; teeth elongate, often somewhat longer than the tube. Probably a cultivated plant: it seems as near to C. Reevesii as to C. macrophylla!" Chang (1951) compares it with C. nudiflora Hook. & Arn. and with C. lobo-apiculata Metc. My good friend, Dr. Santapau, in a letter to me dated February 16, 1948, says "Call. macrophylla var. sinensis is given as a Bombay plant on the word of Gibson, who found it in Kanara; unless we are told which Kanara is meant, we cannot draw any definite conclusion, although I am inclined to think it was the North Kanara [Bombay Pres.], in which Gibson did botanise extensively."

The Griffith 6040/1, cited below, was apparently taken from a cultivated plant in India, the seeds of which were "ex China". Sen & Naskar (1965) record the species as cultivated in India, Bojer (1837) says that it is cultivated in Mauritius. Bailey (1935) reports that it was offered to the horticultural trade at that time by the Singapore Botanical Garden. MacMillan (1943) includes it among the species cultivated in the tropics, calling it a "Large straggling sh.[rub] or small tree. L.[eaves] large, tomentose. Fls. pink, in large cymes. S. China."

Vernacular names reported for the species are "pan ko fa" "sai yeung paan kaau fa", and "tai chung lo kop muk".

Chang (1951) cites Fenzl 16, H. Green s.n., C. I. Lie 124 & 914, and nos. 29, 100, 461, 499, 872, 1178, 1560, 1720, 1835, 1929, 3155, 5287, 6848, 6958, 9649, 16596, 20276, 21842, 23679, 27043, 27748, 31232, 38863, 41422, 44714, 62117, 62473, 63254, 63303, 66369, 67201, 69122, 69899, 70134, 72814, & 72947 of collectors and/or herbaria whose names, unfortunately, he gives only in Chinese characters.

Under Genus 136, Callicarpa, in the Linnean Herbarium in London, sheet no. 2 is inscribed "tomentosa" in Linnaeus' handwriting and "cana" in Solander's writing. The specimen is neither C. tomentosa (L.) Murr. nor C. candicans (Burm. f.) Hochr. [the taxon which used to be called C. cana L.], but is plainly typical C. nudiflora Hook. & Arn.! Sheet no. 3 in the same folder, unidentified, is actually C. candicans.

Material of C. nudiflora has been misidentified and distributed in herbaria under the names C. macrophylla Vahl, C. purpurea A. L. Juss., C. tomentosa Willd., and Premna arborea Roth. On the other hand, the R. C. Ching 7291, distributed as C. nudiflora, is actu-

ally C. arborea Roxb., Barthe s.n. [1857] is C. candicans (Burm. f.) Hochr., Gaudichaud s.n. [Chine, juillet 1839] is C. formosana Rolfe, some of the Herb. Hort. Bot. Calcutt. s.n. distribution is C. pedunculata R. Br., and C. O. Levine s.n. [Herb. Canton Chr. Coll. 1449] is C. rubella Lindl.

In all, 131 herbarium specimens and 4 mounted photographs of C. nudiflora have been examined by me.

Additional citations: INDIA: State undetermined: Herb. Falconer s.n. (K). CHINA: Kwangsi: Steward & Cheo 876 (N); W. T. Tsang 21842 (S). Kwangtung: Chun 3155 (N), 6846 (N), 40422 (N, N); C. O. Levine 349 (Io), s.n. [Herb. Canton Chr. Coll. 349] (W—778666); Nevin s.n. [Canton] (Du—90912); Y. K. Wang 499 (Ca—347394), 1835 (Bz—17244, Ca—374443); Ying 872 (Ca—359004). Province undetermined: N. J. Andersson s.n. [China] (S); Henslow s.n. [1833] (K). CHINESE COASTAL ISLANDS: Hainan: W. Y. Chun 2108 [Herb. Univ. Nanking 7089] (Ca—243565), 5704 (Ca—243565); Chun & Tso 44714 (B, N, W—1675437); C. Ford s.n. [27.7.93] (W—456056), s.n. (N, N); H. Fung 20276 (B, Bz—18103, Ca—11531, N, W—1751091); How 72814 (Bz—18596); Katsumada 21951 (Ca—322499); Lau 1929 (N); Lei 125 (B, Ba, Bi, Bz—18102, Ca—612188, N), 914 (B, Ba, N); Liang 62117 (N), 62473 (La, N), 63254 (N), 63303 (Go, N), 66369 (N, W—1671535); Tak 29 [Herb. Lingnan Univ. 15528] (Ca—315768); W. T. Tsang 29 [Herb. Lingnan Univ. 15528] (N, S, W—1248846); Tsang & Fung 461 [Herb. Lingnan Univ. 17995] (N); C. Wang 32788 (N), 34262 (N, S), 35446 (Go, N). Honam: C. O. Levine s.n. [Herb. Canton Chr. Coll. 1125] (Ka—62836, W—874850, W—877418, W—1010300). Lantau: Taam 1720 (Ca—82283, N, W—2072583); Tak 107 [Herb. Lingnan Univ. 16596] (Ca—341928); W. T. Tsang 16596 (S), s.n. [Herb. Lingnan Univ. 16596] (N, W—1249639). HONGKONG: Bodinier 798 (W—2496755); W. Y. Chun 6846 (Ca—374071); Fortune 86 (S); Hom 28 [Herb. Lingnan Univ. 18453] (N); Taam 1560 (Ca—82728, N, W—2063769); C. Wright s.n. [Hong Kong] (T, W—44906). MACAO: Gaudichaud 83 (W—2496740). INDOCHINA: Annam: Clemens & Clemens 3148 (Ca—340791, N), 3936 (Ca—339371, Mi, N, Ut—309a, W—1427746). Tonkin: Pételot 105 (N, W—1716988). BONIN ISLANDS: Island undetermined: C. Wright s.n. [Bonin Islands] (W—9976). CULTIVATED: Brazil: Bailey & Bailey 791 (Bi); J. Santoro s.n. [Herb. Inst. Agron. Est. S. Paulo 9292] (Be—37206, Ca—40306). India: Griffith 6040/1 (T); Herb. Hort. Bot. Calcutt. s. n. (Bz—18095, Ed, Mu—989). Java: Backer 33433 (Bz—18090, Bz—18091), 33434 (Bz—18092, Bz—18093); Bakhuizen van den Brink s.n. (Bz—25480); Herb. Hort. Bot. Bogor. XI.G.25 (Bz—25717, Bz—25718, Bz—26516, Bz, Bz, N), 25a (Bz, Bz, Bz), 26 (Bz—25719,

Bz—25720, Bz—26517, Bz—26591, Bz, N), 26a (Bz—25721), s.n. (Bz—18094); Pijl 637 (Bz—18089). LOCALITY OF COLLECTION UNDETERMINED: Herb. Linnaeus G.136, S.2 (Ls, Mi—photo, N—photo, N—photo, Z—photo); Jameson s.n. (Ed).

CALLICARPA OBLANCEOLATA Urb. in Fedde, Repert. Spec. Nov. 18: 119. 1922.

Synonymy: Callicarpa inopina Moldenke, Geogr. Distrib. Avicenn. 5, nom. nud. 1939.

Bibliography: Urb. in Fedde, Repert. Spec. Nov. 18: 119. 1922; J. A. Clark, Card Ind. Gen. Sp. Pl. 1922; Urb. in Fedde, Repert. Soec. Nov. 20: 345. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 37. 1929; Moldenke in Fedde, Repert. Spec. Nov. 39: 301 (1936) and 40: 76—77, 119, & 123. 1936; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Prelim. Alph. List Invalid Names 11. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87. 1942; Moldenke, Alph. List Invalid Names 9. 1942; Moldenke, Alph. List Cit. 1: 75, 76, & 185 (1946), 2: 569 & 649—651 (1948), and 4: 1079, 1080, 1094, 1157, 1158, & 1206. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 42 & 177. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 308, fig. 131. 1957; Moldenke, Résumé 50, 243, & 444. 1959; Moldenke, Phytologia 13: 497 (1966) and 14: 42. 1966.

Illustrations: Alain in León & Alain, Fl. Cuba 4: fig. 131. 1957.

Recent collectors refer to this plant as a shrub, 2—4 feet tall, growing in woods, open pine woods, and cutover scrubby pine-land on serpentine-limonite plateaus, as well as on wet savannas, at 800 m. altitude, flowering in April, July, November, and December, and fruiting in April, July, and December. Webster calls it "a rare shrub with purple berries"; actually the fruits are drupes. Marie-Victorin and his associates tell us that it grows with Anastrophia victorinii and in Pinus cubensis woods. The corollas are described as having been "pink" on R. A. Howard 5900, "pale, almost white" on Mrs. G. C. Bucher 100bb & 100v, "purple" on Mrs. G. C. Bucher 100g, 100u, 100w, & 100y, "pale lavender" on Mrs. G. C. Bucher 100 L, and "brighter lavender, almost purple" on her 100m.

Mrs. Bucher has provided me with a large series of specimens from the Moa region of Oriente, Cuba. For a time I was of the opinion that her no. 16, at least, was worthy of specific designation as C. inopina Moldenke, but her series of no. 100's contains examples of so many variations and intergradations that it seems to me now that all her collections had better be included in Urban's C. oblanceolata. A modified description, based on her no. 16, is as follows: "Shrub; branches slender, gray, densely farinaceous with gray or whitish furf, very much less so in age, obscurely tetragonal, somewhat flattened and ampliate at the nodes; nodes not annulate; principal internodes 1—3 cm. long or the uppermost more abbreviated; leaves decussate-opposite, abundant; petioles slender, 5—11 mm. long, grayish-farinaceous, obscurely and shal-

lowly canaliculate above, keeled beneath; leaf-blades coriaceous, gray-green above when mature, brunescent above in drying when immature, sordid-grayish or -yellowish beneath both when immature and mature, narrowly elliptic, 2—4.7 cm. long, 8—17 mm. wide, blunt or subacute at the apex, entire and slightly revolute along the margins (occasionally strongly revolute toward the base on older leaves), minutely white-stellate above when immature, glabrescent and shiny in age, often sparsely impressed black-punctate toward the base above, acute at the base, very densely stellate-tomentellous or -farinaceous with very closely appressed whitish or yellowish furf beneath; midrib slender, impressed above, prominent beneath; secondaries very short, about 7 per side, ascending, arcuate toward the margins and there rather obscurely anastomosing beneath; veinlet reticulation sparse, indiscernible above, only the largest portions discernible beneath; inflorescence supra-axillary; cymes usually one pair at the termination of the year's growth, 2.5—3.5 cm. long, 1.5—2.5 cm. wide, many-flowered, several times dichotomous, densely yellowish-furfuraceous throughout; peduncles slender, about 1 cm. long, flattened; pedicels minute or obsolete; bractlets 1 mm. long or less, subulate, densely yellowish-furfuraceous; prophylla obsolete; calyx campanulate, firm, subtetragonal, about 2.5 mm. long and 2 mm. wide, sparsely granular-pulverulent outside, its rim subtruncate, minutely 4-apiculate; corolla small, hypocrateriform, its tube broadly infundibular, cylindric at the base, about 2 mm. long, broadly ampliate above, glabrous (or very sparsely granular-pulverulent at the apex outside), its limb 4-parted, the lobes broadly elliptic-lingulate, about 1.2 mm. long and wide, obtuse at the apex, sparsely granular-pulverulent outside; stamens 4, inserted about 0.5 mm. above the base of the corolla-tube; filaments filiform, to 3.5 mm. long, glabrous, one sometimes much shorter; anthers oblong, to 1.2 mm. long and 0.7 mm. wide, opening by longitudinal slits.

Mrs. Bucher's nos. 100a, 100b, 100e, & 100h have the leaf-blades decidedly pale beneath, 100i & 100j have them pale and with curled edges, 100m has them extra wide, 100k has them wide and also pale, 100q has them long and slender, 100y has all the edges of the leaf-blades revolute, 100s exhibits both large and small leaves on the same branches (it was collected in November, the rainy season), 100v has wide leaves said by the collector to be "very tan underneath, not gray", 100w has its leaf-blades sparsely dentate toward the apex and is said by the collector to have had "wider leaves and scattered flowers", 100r also shows the leaves decidedly toothed at the apex and of it the collector notes "These certainly look different — wavy edges — smaller flowers in more delicate arrangement", concerning 100c & 100d she says "All these leaves look different, more veined, rougher and wider", and concerning 100g she asks "and what of this leaf, under [side] not clean tan?" Clément 4122 has its leaf-blades all sharp-pointed at the apex, while León & Clément 23128 [July 1949] has relatively huge leaves and certainly does not look like C. oblanceolata at all!

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"BEFORE NATURE DIES" by Jean Dorst, translated by Constance D. Sherman, 352 pp., illus., Houghton Mifflin Co., Boston, Mass. 02107. 1970. \$8.95.

These well expressed thoughts about this most important topic first appeared in Switzerland in 1965 under the title of "Avant que Nature Meure". The translator has rendered a faithful and smooth language switch such as she previously provided in the author's earlier "Migration of Birds" and has also brought statistical materials up to date. The book is well illustrated with colored and black-and-white photographs and line drawings, well indexed, and well documented with bibliography.

Contrasting the minor effects of the smaller number of pre-industrial humans on their environment with that of the burgeoning populations of today that are destroying the land, water, air and energy sources, the author provides valid, concrete and convincing suggestions of how modern man can live as one with nature and so provide for his own survival.

The printing is neat and easily legible. Only two small errors were noted: on p. 257 the letter "v" is inverted in "have" and on p. 323 the "f" is omitted in "four". On p. 187 "wheat smut" is equated with Lychnis [Agrostemma] githago.

"MAN AND THE NATURAL WORLD -- An Introduction to Life Science" by Coleman J. & Olive B. Goin, x & 643 pp., illus., The Macmillan Company, Riverside, New Jersey 08075. 1970. \$9.95.

In the preface to this attractive text the authors state that they "believe that the general student, to be a well-informed citizen, should not only have an understanding of his own body, his own reproductive process, and his own inheritance, but should also have a sufficient biological background to comprehend the problem of population control, the genetic effects of radiation, the implications of pollution, and the basic concepts of behavior [and they] do not feel that such technical details as the anatomy of the clam or the whole series of reactions involved in the tricarboxylic acid cycle are a necessary part of the core of knowledge of a banker, lawyer, merchant, or housewife." This emphasis is logical and the approach is simple: in fact, so simple that it does not go much beyond the better of the new high school biology texts. But the use of this text is far wiser for the non-biology major than those texts so burdened in their opening chapters with detailed microbiology and biochemistry that the students are not "turned on" by this wonderful field of learning.

Many of the diagrams are very helpful but the one on p. 125

adds nothing but errors.

The references given after each chapter are usually easily accessible and easily readable, but no references are given to such a popular scientific work as Dr. Paul Ehrlich's "Population Bomb" and other writings.

On p. 161 apparently is misspelled and on p. 126 an infinitive is split.

"INTRODUCTION TO THE FINE STRUCTURE OF PLANT CELLS" by Myron C. Ledbetter & Keith R. Porter, ix & 188 pp., illus., Springer-Verlag, Heidelberg, Berlin, New York, N. Y. 10010. 1970. \$14.80.

With 51 exquisite oversized full plates and 8 text figures, with matching and provocative text, and with related literature references for each, the authors have presented a work of art and science to viewers. These should be many, many more than just the amateur, student, teaching and professional cytologists and electron microscopists. What a pleasure and orienter this collection of electron micrographs could be for all beginning and stumbling biology students first at their microscopes! All schools should have a few copies of this book on their library shelves, especially since the price is so reasonable.

This atlas includes general and fine cell structure, dividing cells, cell walls and plasmodesmata, vascular tissues, sc(h)lerenchyma and collenchyma, epidermal cells and variants, photosynthetic cells and apparatus, cells with special inclusions, and germinative cells.

The printing and paper are of high quality. On p. 34 Allium is misspelled; on p. 121 the genus and species names are run together.

"THE VEGETATION OF THE NEW JERSEY PINE-BARRENS — An Ecologic Investigation" by John W. Harshberger, xi & 329 pp., illus., map, unabridged republication of the 1916 edition. Dover Publications Co., New York, N. Y. 10014. 1970. \$3.50 paperback.

Especially because of the increasing interest in ecology on the part of the general public as well as that of the scientists and because of airfield construction threats, many scientists and aroused citizens will be interested in studying and preserving this distinctive area in New Jersey. This sturdy paperback book will provide valuable and interesting information. It is so good to have it freshly available now. It is hoped that the companion volume by Wither Stone, "The Plants of Southern New Jersey, with Especial Reference to the Flora of the Pine-Barrens and the Geographic Distribution of the Species", may also be made similarly available soon.

Harshberger deals with the following topics: physiography and geography, man's commercial effects, various phytogeographical

formations, plants of each area, cone production, insect galls, and finally pine-barren plants from an evolutionary viewpoint. The many photographs add considerably to the text and in some cases show "what was" under a present farm or housing development. Naturally the plant nomenclature is that of 60 years ago and the index is still far from complete.

"PROGRESS IN PHYTOCHEMISTRY", Volume 2 edited by L. Reinhold & Y. Liwischitz, ix & 512 pp., illus., Interscience Publishers of John Wiley & Sons, London, New York, N. Y. 10016, Sydney & Toronto. 1970. \$27.50.

This series performs effectively a necessary service for both the "initiated and the uninitiated" who wish to keep abreast of the rapid developments in phytochemistry. The eight papers are well written, well printed (accessory is misspelled on p. 150), well illustrated and well documented with full and recent bibliographies. All is indexed.

The topics are: 1 - biochemistry of pollen, 2 - C_4 -dicarboxylic acid pathway in photosynthesis affecting different chloroplasts and conditions than the Calvin cycles, 3 - fraction-1 protein and photosynthetic CO_2 -fixation in chloroplasts, 4 - mutual and antagonistic relations among certain plants, their insect visitors and avoiders, their isoprenoids, and the role and development of specialized insect hormones in plants, 5 - non-protein amino acids in plants and their antimetabolite actions, 6 - prenyl phytoquinones including the role polyprenyl quinones as redox carriers in electron transplant and coupling agents from it to phosphorylation in mitochondria and chloroplasts, 7 - ethylene with its abscissic and fruit ripening actions, and 8 - limonoids limited to the Meliaceae and the Rutaceae and quassinoids limited to the Simaroubaceae.

"THE INDUCTION OF FLOWERING — Some Case Histories" edited by L. T. Evans, 488 pp., illus., Cornell University Press, Ithaca, N. Y. 14850. 1969. \$18.50.

Between the covers of this book is well gathered and carefully evaluated a vast amount of valuable material in a most convenient form. The case histories by different authors are of Xanthium strumarium, Glycine max, Pharbitis nil, Perilla, Chenopodium rubrum, Lemna perpusilla, Cannabis sativa, Kalanchoë blossfeldiana, Fragaria, Chrysanthemum morifolium, Arabidopsis thaliana, Sinapis alba, Lolium temulentum, Silene armeria, Brassica campestris, Anagallis arvensis, Pisum sativum, Lycopersicon esculentum, Cestrum nocturnum and Bryophyllum. Each is discussed with reference to experimental work according to the following topics: history, growth and growing techniques, inflorescence structure, effects of aging, vernalization, photoperiod response, spectral dependence, endogenous rhythms, fractional induction, photoperiodic inhibition

and dual responses, effects of temperature and mineral nutrition and gas composition, translocation of the floral stimulus, grafting, growth promoters and retardants, florigenic extracts, induction of excised apices, and chemical and ultrastructural changes at induction.

The final chapter is an excellent summary by the editor. "Inductive photoperiodic conditions lead to the export from leaves of floral stimuli which may differ between plants. Non-inductive conditions can lead to the export of inhibitors of flower evocation, whose production is also under photoperiodic control. Besides these primary photoperiodic stimuli there may also be produced a more stable, and possibly more universal, graft-transmissible flower hormone. This can be generated, independently of floral evocation, by extended photoperiodic induction of leaves (Perilla), or by secondary induction of young leaves (Xanthium) or defoliated leaves (Silene), or simply with increasing age (Pisum). There is thus a multiplicity of floral stimuli, and what is a positive stimulus to floral evocation in one plant or condition may be inhibitory to it in another, as are the gibberellins and abscisin."

Each paper is well printed and has its own detailed bibliography, adding so much to all the valuable data given.

The price is more astronomical than botanical!

TWO NEW VARIETIES OF PIPEWORT

Harold N. Moldenke

LEIOTHRIX DUBIA var. VILLOSA Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis densissime albo-villosis pilis antrorsis recedit. This variety differs from the typical form of the species in having its peduncles very densely white-villous with antrorse hairs.

The type of the variety was collected by H. S. Irwin, H. Maxwell, and D. C. Wasshausen (no. 20481) in a wet campo in an area of campo slopes and sandstone outcrops in the Serra do Cipó, at km. 115 about 140 km. north of Belo Horizonte, Minas Gerais, Brazil, on February 19, 1968, and is deposited in the Britton Herbarium at the New York Botanical Garden.

SYNGONANTHUS DENSIFLORUS var. GLABRESCENS Moldenke, var. nov.

Haec varietas a forma typica speciei foliis vaginisque glabris vel subglabris recedit.

The type of the variety was collected by H. S. Irwin, R. Souza, J. W. Grear, and R. Reis dos Santos (no. 17022) on a periodically flooded campo, 400 m. alt., ca. 30 km. S. of Xavantina, Mato Grosso, Brazil, on June 12, 1966, and is deposited in my personal herbarium at Plainfield, New Jersey.

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 21

July, 1971

No. 6

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
or \$8, at close of volume

AUG 5 1971

CERTAMEN MELASTOMATACEIS XVII.

John J. Wurdack

U. S. National Herbarium, Smithsonian Institution

The present melastome miscellany continues the notes on neotropical species based on data from my European trip under the auspices of the Smithsonian Research Foundation and subsequent loans (Phytologia 20: 369-389. 1970; Phytologia 21: 115-130. 1971). Included also is the beginning of publication on the numerous collections assembled by J. Terborgh, T. R. Dudley, J. Knox, M. T. Madison, and F. Wolfe from the region of the northern outlier of the Cordillera Vilcabamba; this Peruvian material was gathered under the auspices of the National Geographic Society and National Science Foundation (Grant GB-12378). Of course too, no melastome article would be complete without some inclusion of the taxonomic problems continually uncovered by Julian Steyermark and others in Venezuela.

MERIANIA VILCABAMBENSIS Wurdack, sp. nov.

M. boliviensis Cogn. affinis, foliorum subtus venis primariis pilis pilulisque non pinoideis hypanthiis non appresso-setulosis calycis dentibus exterioribus non vel paullulo (usque ad 1 mm) eminentibus differt.

Ramuli obscure quadrangulati demum teretes sicut foliorum venae primariae subtus inflorescentia hypanthiaque modice vel sparse caduceque granuloso-furfuracei, nodis linea elevata interpetiolaris notatis. Petioli 1-2 cm longi; lamina 10-17 X 3.5-6.5 cm paulo obovato-elliptica apice breviter gradatimque acuminato basi acuta, membranacea et obscure undulato-serrulata, ubique in superficie glabra, subtus in venis primariis sparsissime caduceque setulosa pilis gracilibus laevibus 0.3-0.8 mm longis inconspicue caduceque glanduliferis, 5(-7)-plinervata (pari interiore 1-2.5 cm supra basim divergenti) nervis secundariis ca. 0.5 cm inter se distantibus nervulis subtus planis laxe reticulatis (areolis ca. 1 mm latis). Panicula laxa pauciflora ca. 10 cm longa; flores 5-meri umbelliforme aggregati, pedicellis 0.9-1.3 cm longis. Hypanthium (ad torum) 6 X 6-7 mm teretum sparse nigro-tuberculatum; calycis tubus ca. 3 mm longus, lobis interioribus ca. 5 X 4.5-4.8 mm oblongis apice rotundato, dentibus exterioribus ca. 1 mm liberis crassis ad anthesim non eminentibus. Petala 16-17.5 X 12-13 mm obovata apice rotundato. Stamina paulo dimorphica glabra; filamenta 11.5 vel 10.5 mm longa; antherarum thecae 9.5 vel 9 X 1.1 X 1.5 mm subulatae declinatae, poro dorsaliter inclinato 0.5 mm diam.; connectivum usque ad filamentum insertionem non prolongatum, dente basali hebeti-acuto 4 X 1 X 0.6 mm vel 2.6 X 0.8 X 2.3 mm, appendice ascendenti hebeti 3 X 0.6 X 0.5 mm vel 2 X 0.2 X 0.6-0.3 mm. Stigma punctiforme; stylus 10 X 1-0.4 mm glaber; ovarium

5-loculare glabrum, apice 5-lobato lobis hebetibus ca. 0.5 mm altis.

Type Collection: T. R. Dudley 10595 (holotype NA; isotype US), collected in dense montane rainforest on steep damp banks bordering Knox's Cascade, ca. 14 km NE from Hacienda Luisiana and Rio Apurimac, Cordillera Vilcabamba, Prov. Convención, Depto. Cuzco, Peru, 73° 35' W, 12° 35' N, elev. 1730 m, 28 June 1968. "Small tree 15-25 ft., 2-6 in. diam.; branches stiffly ascending; lvs. dark green, glossy; fl. in terminal inflorescence, deep pink; anther horns deep purple."

Paratype (topotypical): T. R. Dudley 10583 (NA, US).

Meriania boliviensis has relatively broader and basally less attenuate leaf blades, with distinctly stellulate-pinoid primary vein hairs on the lower surface (a few simple caducous setulae intermixed); the hypanthia are densely covered with stellulate-pinoid hairs (some hairs with protracted setuliform tips) and the densely pinoid-puberulent external calyx teeth project ca. 3 mm beyond the interior lobes. Both species have the basal connective spur on the small stamens much flattened and broadened. Cogniaux' anther dimensions for M. boliviensis apparently are from a bud, as mature anthers (Bang 288) are 9 or 6 mm long (dry), with the dorsal ascending appendage somewhat smaller than in M. vilcabambensis. Another relative (ex char.) of M. vilcabambensis, the Colombian M. tuberculata Triana, differs at least in the (essentially) basally 7-nerved leaf blades with rounded bases, somewhat costate hypanthia, and shorter calyx lobes, as well as (if my determinations of several recent Antioquia collections are correct: Daniel 1712; Core 767; Scolnik & Barkley 19An197; Johnson & Barkley 18C835) the stellulate-pinoid trichomes. Both of the recently described Cuzco species, M. cuzcoana Wurdack and M. vargasii Wurdack, are quite different vegetatively from M. vilcabambensis; the latter of the two has somewhat the same leaf shape, but abundant foliar and hypanthial pubescence and much longer external calyx teeth.

SALPINGA PERUVIANA (Cogn.) Wurdack, comb. nov.

Macrocentrum fasciculatum (Rich.) Triana var. peruvianum Cogn., Bot. Jahrb. 42: 138. 1908.

Macrocentrum peruvianum (Cogn.) Macbride, Field Mus. Publ. Bot. 4: 177. 1929.

The phytogeography and fruit leave no doubts as to the proper generic disposition of Cogniaux' variety; Macbride was correct in his 1929 remarks about the distinctness from M. fasciculatum. To S. peruviana, I have referred F. Wolfe 12319 (NA, US), from the slopes of the Cerros del Sira, southwestern slope of the Río Llullapichi watershed, Depto. Huánuco, Peru, elev. 1290 m ("Ascending herb; fl. white"); the Huánuco material has somewhat smaller (to 1.9 X 1.3 cm) leaf blades than in the Weberbauer collection. Salpinga peruviana differs from S. maranonensis Wurdack in the smaller leaf blades with shorter (0.5-1 mm long) and less persistent hairs on the upper surfaces, as well as the smaller flowers and fruit (petals 4-5 mm long and

white, rather than 16-19 mm long and pink; fruiting body 4-5 mm shorter). The Colombian S. dimorpha (Gleason) Wurdack and the Peruvian S. ciliata Pilger differ at least in the larger and more prominently toothed leaf blades and larger flowers.

LEANDRA STEYERMARKII Wurdack, sp. nov.

L. aristigeræ (Naud.) Cogn. et L. lasiopetalæ Cogn. affinis, habitu et foliis minoribus differt.

Ramuli radicanes sicut petioli foliorum venae primariae subtus inflorescentia hypanthiaque densiuscule pilis patentibus glanduliferis gracilibus laevibus plerumque ca. 0.6-1 mm longis densiuscule induti et pilis stellulatis ca. 0.05 mm latis modice puberuli. Folia in quoque par in dimensionibus paulo dimorphica (ca. 1:1.5-2); petioli 0.6-1.2 cm longi; lamina (acumine excluso) 3-7.5 X 1.5-4 cm, elliptico-oblonga apice per 1-1.5 cm subabrupte acuminato basi paulo (0.2-0.3 cm) cordata, membranacea et obscure undulato-serrulata, supra in superficie sparse appresso-setulosa pilis 0.5-1 mm longis glanduliferis demum caducis in venis primariis sparse pilis pinoideis 0.2-0.3 mm longis setulosa, subtus sparsiuscule pilis erectis caduce glanduliferis laevibus ca. 1 mm longis induta, 5-nervata nervis secundariis plerumque 0.4-0.5 cm inter se distantibus nervulis subtus paullulo elevato-reticulatis (areolis ca. 0.5-1 mm latis). Panicula terminalis pauciflora 2.5-4 cm longa, ramis divaricatis; flores 5-meri, pedicellis supra bracteolas ca. 0.3-0.5 mm longis, bracteolis inconspicuis 0.3-0.4 mm longis glanduloso-setulosis persistentibus. Hypanthium (ad torum) 2 mm longum; calycis tubus 0.2 mm altus, lobis interioribus ca. 0.5 mm altis ovatis, dentibus exterioribus glanduloso-setulosis 0.6-0.7 mm eminentibus; torus sparse glanduloso-setulosus (0.1-0.15 mm). Petala 2.8 X 1 mm lanceolato-oblonga granulosa (apice hebeti-acuto) extus per costam sparse glanduloso-setulosa et dente glanduloso-setuloso 0.5-0.6 mm longo et ca. 0.3-0.4 mm eminente armata. Stamina isomorphica glabra; filamenta 1.6 mm longa; antherarum thecae lanceatae 2.2-2.3 X 0.3 mm, connectivo basaliter paulo (0.2 mm) prolongato non appendiculato. Stigma truncatum; stylus glaber, 4 X 0.25 mm, in ovarii collo 0.3 mm immersus; ovarium (unum dissectum) 4-loculare 0.6 inferum, apice conico 0.6 mm alto granuloso sparse setuloso (setulis ca. 10, 0.1-0.15 mm longis).

Type Collection: J. A. Steyermark & G. S. Bunting 102757 (holotype US 2585847A; isotype VEN), collected near the airport at San Carlos de Río Negro, Terr. Amazonas, Venezuela, elev. 125 m, 17-18 April 1970. "Vining; stem slender; leaves membranous, rich green above, pale green below with raised nerves; petioles green, with brownish hairs; inflorescence branches pale green; calyx pale green; petals white."

Both suggested relatives are erect shrubs with leaf blades about 2-3 times as large as in L. steyermarkii and stamen connectives not at all prolonged. Leandra aristigera has longer external calyx teeth and longer corolla mucros, while L. lasiopoda has shortly pseudo-plinerved leaf blades with broadly

acute bases. Despite my recent perplexity with this complex (Phytologia 20: 377-378. 1970), L. steyermarkii seems specifically distinct. In vegetative pubescence, the San Carlos species resembles Clidemia stellipilis (Gleason) Wurdack and in habit, Clidemia epibaterium DC.

MICONIA DUDLEYI Wurdack, sp. nov.

M. phlebodi Wurdack affinis, foliorum laminis ad basim acutis venularum subtus areolis latioribus hypanthiorum pubescentia stellulata petalis ovarisque glabris antherarum thecis late porosis differt.

Frutex vel arbor 3-9 m; ramuli plusminusve ancipiti, sicut foliorum venae primariae secundariaeque subtus inflorescentia hypanthiaque pilis pinoideo-stellulatis 0.1-0.15 mm longis latisque modice vel dense induti; ramorum inflorescentiarumque nodi pilis barbellatis usque ad 0.5 mm longis densiuscule caduceque armati. Petioli 2.5-4.5 cm longi; lamina 15-33 X 6-15 cm oblongo-elliptica apice subabrupte breviterque (usque ad 2 cm) acuminato basi acuta, membranacea et undulato-serrulata, supra glabra, subtus in venulis sparse stellulato-furfuracea in superficie glabra, 5-nervata (pari inframarginali tenui incluso) nervis secundariis ca. 1 cm inter se distantibus sicut tertiariis subtus paulo elevatis nervulis planis areolis ca. 0.5 mm latis. Panicula ca. 15-20 cm longa multiflora ramis primariis in quoque nodo plerumque 4, bracteis 3-5 X 0.2-0.5 mm valde caducis, bracteolis non visis; flores 5-meri sessiles in ramulis interrupto-glomerati. Hypanthium (ad torum) 2.3-2.5 mm longum; calycis tubus 0.5-0.7 mm altus limbo paulo (0.1-0.2 mm) undulato-denticulato, dentibus exterioribus minutis non eminentibus. Petala glabra 2.5-2.9 X 1.2-1.4 mm obovato-oblonga apice paulo emarginato. Stamina paulo dimorphica glabra; filamenta 2.5-3 mm longa; antherarum thecae 2-2.3 X 0.25 X 0.4 mm vel 1.2-1.9 X 0.2 X 0.25 mm oblongae, poro lato; connectivum non prolongatum dorsaliter ad basim dente hebeti descendente 0.2 mm vel 0.1 mm armatum. Stigma paulo expansum 0.4 mm diam.; stylus glaber 7-7.5 X 0.2 mm; ovarium 3(-4)-loculare 0.8 inferum apice glabro 0.2 mm alto.

Type Collection: T. R. Dudley 11489 (holotype US 2587599A; isotype NA), collected in rainforest at edge of Río Mapitunuari ca. 4 km NE from Hacienda Luisiana and Río Apurimac, 12° 30' S, 74° 30' W, Prov. Convención, Depto. Cuzco, Peru, elev. ca. 670 m, 31 July 1968. "Heavy robust many-stemmed clump-forming shrub 15-20 ft. tall; lvs. dark green and glossy above, yellowish and glossy below, up to 2.5 ft. long; fl. white; mature fruit brownish purple."

Paratypes: Dudley 11509 (fruiting) and M. T. Madison 10045 (young bud), both topotypical; Killip & Smith 25891 (US), from Porvenir, Pichis Trail, Depto. Junín, Peru, elev. 1500-1900 m.

Miconia phlebodes has obtuse- to truncate-based leaf blades with finer venule areoles, hypanthia granulose-furfuraceous, petals granulose externally, anthers with narrower pores and bilobed connective bases, and granulose ovary apices. Miconia

herreriae Gleason has similar foliage but larger trichomes, smaller inflorescences with pleiostemonous flowers glomerulate only at the branchlet ends, broader hypanthia, and relatively wider petals (2.5 X 1.6-1.9 mm); although several recent collections have been attributed to M. herreriae, the only one truly comparable with the holotype is Vargas 18339 (Macchupicchu, Cuzco), the other material so identified actually being related (undescribed?) to M. eriocalyx Cogn., M. falcata Cogn., and M. dipsacea Naud. None of the other Miconia species with gross facies similar to M. dudleyi (M. zubenetana Macbride, M. egenis Cogn.) seems closely related in floral features. The Junin collection of M. dudleyi was mistakenly distributed as M. scorpioides (S. & C.) Naud.; that widespread species (correctly M. trinervia [Sw.] Don ex Loud.) has plinerved leaf blades and flowers unilateral on the inflorescence branchlets.

MICONIA SPENNEROSTACHYA Naud.

Miconia pauciglandulosa Naud., Ann. Sci. Nat. ser. 3 Bot. 16: 183. 1851.

All of the Poeppig collections (W) cited by Cogniaux show nectaries adaxially on the petiole apices or leaf blade bases and flowers secund on the ultimate inflorescence branchlets; the buds of Mathews 1305 (FI) have anther connectives basally with glands. Gleason (Bull. Torrey Club 58: 237. 1931) and Macbride (Field Mus. Publ. Bot. 13, 4: 454. 1941) had earlier (and correctly) synonymized M. aspiazu Macbride and M. nectaria Macbride under M. spennerostachya. The leaf shape and degree of plinervation are quite variable; M. aspiazu conforms to M. spennerostachya var. angustifolia Cogn. Among the available collections, the amount of plinervation and also nectary development is least in Klug 2620. Despite the previous descriptions, all material of M. spennerostachya has the petals granulose, the styles sparsely to moderately beset with clavate glands basally, the ovary apices moderately beset with minute glands, and the ovaries predominantly 4-5-celled. Undoubtedly the closest relative of M. spennerostachya is M. venulosa Wurdack, with no foliar nectary development and eglandular anther connectives; recent collections of M. venulosa include Asplund 18898 (Napo-Pastaza, Ecuador), Prieto ChuP-10 (Santiago-Zamora, Ecuador), and Woytkowski 7539 (Loreto, Peru; distributed as M. prasina).

MICONIA BUNTINGII Wurdack, sp. nov.

M. tetragonae Cogn. affinis, ramulis teretibus ramulorum inflorescentiarum hypanthiorumque trichomatibus maioribus pinoid-eis stigmatem non expanso differt.

Ramuli subteretes sicut petioli foliorum venae primariae subtus inflorescentiaque dense pilis pinoideis 0.1-0.15 mm diam. longisque induti; lineae interpetiolares non evolutae. Petioli 1-2 cm longi; lamina (acumine excluso) 5-14 X 3-6.5 cm, elliptica apice subabrupte angustaque acuminato (1-1.8 cm) basi late acuta, membranacea et integra, ubique primum sparse pinoideo-puberula, supra glabrata, 5-nervata nervis secundariis ca. 0.4-0.5 cm

inter se distantibus nervulis subtus inconspicuis planis laxe reticulatis (areolis ca. 0.7-1 mm latis). Panicula ca. 10 cm longa lataque multiflora, ramis primariis secundariisque in quoque nodo plerumque 4; flores 5-meri alabastris maturis solum cognitis, bracteolis 0.2-0.3 mm longis mox caducis ad hypanthiorum bases insertis, pedicellis 0.4-0.6 mm longis. Hypanthium (ad torum) 1.2-1.4 mm longum extus modice pinoideo-puberulum; calyx ca. 0.2 mm longus paullulo (0.05-0.1 mm) 5-undulatus, dentibus exterioribus minutis non eminentibus. Petala 1.2 X 1 mm suborbicularia paulo granulosa. Stamina vix dimorphica glabra; thecae 0.3 X 0.15-0.2 mm; connectivum 0.6 mm vel 0.4 mm prolongatum dorsaliter infra filamentum insertionem 0.4 mm vel 0.1 mm prolongatum. Stigma non expansum; stylus glaber in ovarii apicem ca. 0.3 mm immersus; ovarium 3-loculare $\frac{1}{2}$ inferum apice conico paullulo lobulato vix granuloso.

Type Collection: J. A. Steyermark & G. S. Bunting 102930 (holotype US 2585825A; isotype VEN), collected in rainforest 7-9 km from Yavita on the way to Pimichín, Terr. Amazonas, Venezuela, elev. 125 m, 22 April 1970. "Tree 8 m; leaves membranous, dull green above, dull green below with dull yellow nerves and midrib."

Miconia tetragona has sharply tetragonal young branchlets with substellulate hairs ca. 0.05 mm diam., hypanthia resinous-granulose outside, small anthers not appendaged, and a subpeltate stigma ca. 0.7 mm diam. Miconia perturbata Wurdack has firmer very shortly blunt-acuminate leaf blades glabrous on the lower surface, larger flowers, and definite triangular calyx lobes 0.2-0.3 mm long. Other Miconia species with vegetative and inflorescence aspect rather similar to M. buntingii include M. regelii Cogn. (inflorescence branches opposite; anthers longer), M. tetrasperma Gleason and M. tetraspermoides Wurdack (firmer leaf blades, acute petals, long anther thecae), and M. pilgeriana Ule (firmer and somewhat larger leaf blades, basally exappendiculate anther connectives, and rimose anther thecae rounded at the apex). The anther dehiscence in M. buntingii was not ascertainable from the mature flower buds. Miconia eugenioides Triana grows in the same region as M. buntingii, but is distinguishable by the finer pubescence, firmer leaf blades glabrous on the lower surface, much longer acutish petals, lanceate anther thecae with cordulate connective appendages, and truncate ovary apices.

MICONIA MALATESTAE Macbride

Collected thrice recently at Carpish, Huánuco, Peru (Asplund 13118; Ferreira 2295; Hutchison, Wright, & Straw 5940), the species is distinguishable by the large firm finely serrulate leaf blades with stout petioles and the well-developed cauline nodal flaps. Macbride had placed M. malatestae in Sect. Miconia; however, I believe that it is a dioecious species of Sect. Cremanium, known still only from female collections and best placed near M. coelestis (Don) Naud. The type material of M. coelestis (FI, OXF) shows similar but smaller flowers (also

female, with abortive anthers) and branchlet nodes without developed flaps (the obscure interpetiolar lines marked by roughened setulae 0.3-0.5 mm long).

MICONIA TABAYENSIS Wurdack, nom. nov.

Miconia micrantha Pittier, Bol. Soc. Venez. Cienc. Nat. 11: 27. 1947, nec *M. micrantha* Cogn. (Bull. Torrey Club 23: 16. 1896) nec *M. micrantha* Pilger (Verh. Bot. Ver. Brand. 47: 173. 1905; *M. wittii* Ule, nom. nov., Notizbl. Bot. Gart. Berl. 6: 367. 1915).

Pittier published a nomen nudum (Cat. Fl. Venez. 2: 236. 1947) based upon *Gehriger* 595 and in the same year the description for *M. micrantha* based on the same collection; the Instituto Botanico material has a third (but unpublished) binomial indicated on their specimens. Aristeguieta and Steyermark both have indicated (in correspondence) that the relative dates of publication in 1947 cannot be established. *Miconia tabayensis* is distinctive in its lower leaf surfaces sparsely to moderately setulose with apically irregularly branched or barbellate hairs 0.2-0.7 mm long. Another collection (topotypical) of *M. tabayensis* is *Gehriger* 382 (distributed as *M. resimoides* Cogn.), with male flowers; *Gehriger* 595 is female. *Miconia laetevirens* Uribe is superficially rather like *M. tabayensis*, but has shorter less barbellate pubescence, 3-nerved leaf blades, and perfect flowers. *Miconia purulensis* Donn. Smith has pubescence of clavate apically roughened but basally smooth hairs and relatively narrower anther thecae (1 X 0.3 mm), but is also dioecious. *Miconia boliviensis* Cogn. has shorter (ca. 0.2 mm) clavate-pinoid hairs on the primary veins of the lower leaf surfaces, rather densely robust-ciliolate leaf margins, and considerably larger flowers. *Miconia acanthocoryne* Wurdack has thicker 3-nerved caudate-acuminate leaf blades and perfect flowers; the original stamen dimensions given (Phytologia 5: 128) were erroneously magnified by a factor of 3.

MICONIA LATIFOLIA (D. Don) Naud.

Chiloporus andinus Naud., Ann. Sci. Nat. ser. 3 Bot. 4: 57, pl. 3, fig. 7. 1845.

Miconia andina (Naud.) Naud., Ann. Sci. Nat. ser. 3 Bot. 16: 236. 1851.

Miconia epiphytica Cogn., DC. Mon. Phan. 7: 934. 1891.

The type collections (OXF, P) of all the taxa have been examined; Cogniaux evidently never saw the Pavón type of *M. latifolia*, which is best matched in modern collections by *Tovar* 4080 (US) from Huancavelica, Peru. The degree of setula development on stems and lower leaf surfaces is quite variable, but the floral features (especially the short anthers) seem constant. Both *M. alpina* Cogn. and *M. fruticulosa* Cogn. (material not at hand) must be evaluated in connection with *M. latifolia*. *Miconia griffisii* Macbride (isotype US) has hypanthia more-or-less setulose and branchlets densely setulose, but does not seem to

differ in internal floral features from M. latifolia; it is perhaps infraspecifically distinct. Macbride described M. ottikeri as with 5-lobed fruiting calyces; however the US isotype has definitely 4-merous fruit. In M. ottikeri (but with no real conviction as to the specific distinctness from M. latifolia), I have placed two recent collections (both with larger leaf blades than the type; style and filaments glabrous): Wurdack 1688 and Sanchez 357, both from the Cerros de Calla-Calla, Amazonas, Peru.

MICONIA THYRSIFLORA (Don) Naud.

Miconia integrifolia Cogn., DC. Mon. Phan. 7: 936. 1891.

Both types (G-BOISS, OXF) actually are identical, probably parts of the same collection. The species differs from M. latifolia in the densely pinoid-puberulous branchlets, entire leaf blades, slightly smaller flowers, densely (rather than sparsely) glandular-puberulous styles, and galeate (rather than capitellate) stigmas. The original publication by Don was as Cremanium thyrsoiflorum; the chain of misspellings (as "thyrsoidea") was started by De Candolle (Prodromus 3: 191. 1828) and followed by Naudin, Cogniaux, and Macbride but not Triana; Naudin, rather than Triana, should be regarded as the combining author (having cited De Candolle who in turn cited Don), despite his spelling of the epithet. Macbride's note about the affinities with M. flavescens Cogn. was a perceptive remark; actually both M. flavescens and M. mandonii Cogn. have 4-merous flowers and the latter species also has galeate stigmas. As alluded by Macbride in the Flora of Peru, his photograph (17179) and that of Gleason (7-2) from the Berlin herbarium are actually of M. nitida (Don) Naud., rather than M. thyrsoiflora. Another Pavón specimen mixup is with M. laurina (Don) Naud.; the Pavón collections (OXF, US, the latter ex Herb. Lambert) represent a form of M. media (Don) Naud. with essentially entire-margined leaf blades. Probably M. laurina should be regarded as a subspecies of M. media, but more collections are needed (cf. Phytologia 9: 421. 1964).

ALLONEURON Pilger

Among New World melastomes, two characters rarely occur, haplostemony and capsular fruit developing from an inferior ovary. The conjunction of these features appears only in Alloneuron Pilger, Cyphostyla Gleason, and Allomaieta Gleason. Other genera with haplostemony (no trace of the antepetalous stamens or staminodia) include Poteranthera Bongard (one of the two species), Siphanthera Pohl ex DC. (a few species), Monochaetum Naud. (a few species), and Miconia R. & P. (one species, M. tetrandra [Sw.] Naud.), all except Miconia with superior ovaries and capsular fruits. Diplostemonous genera with inferior ovaries followed by capsular fruit are Tateanthus Gleason and (ex descr.) Merianthera Kuhl. Pittier (Journ. Wash. Acad. Sci. 19: 184. 1929) ascribed leathery capsules to Anaectocalyx latifolia Cogn.; the currently available collections of

Anaectocalyx are insufficient to affirm or deny this feature. Cyphostyla and Allomaleta were segregated by Gleason into a separate tribe, Cyphostyleae; both genera have simple smooth trichomes and relatively large flowers with exappendiculate anthers and 5-celled ovaries. The present collections of the Cyphostyleae are quite inadequate for further generic elucidation; however, Cyphostyla hirsuta Gleason is currently being evaluated by Charles Schnell in connection with Conostegia myriasporoides Triana.

While Macbride was studying the synonymy of Meiandra Mgf. under Alloneuron (Trop. Woods 17: 13. 1929), the branchlet wood structure was found by Record to conform with that of the Miconieae rather than Memecyleae; further study of the anatomy of mature wood is needed, a recent sample having been collected with Cuatrecasas 15764 (USw 33129). In superficial vegetative facies, the two species of Alloneuron from lowland Amazonian Peru and Colombia resemble Gesneriaceae; both species have stellulate as well as simple smooth hairs and pedicellate flowers unilaterally arranged on the inflorescence branchlets. The four species now being described differ from the original two in the pinoid to squamate trichomes (in the inflorescences microscopically and very caducously gland-tipped) and nearly sessile glomerulate flowers (the glomerules perhaps actually with unilateral flowers borne on a much shortened axis, but this feature not really evaluable superficially in pressed specimens); nonetheless, in internal floral features, all six species are much alike.

While Pilger described A. ulei Pilger as with 2-celled ovaries (followed by Macbride in the Flora of Peru), Markgraf's diagnoses for both species of Meiandra cited 3-celled ovaries; I believe that Markgraf's description of this feature is the correct one for the genus. The capsular dehiscence is at first central through the hypanthium wall, at length extending to the capsule apex; the seeds are pyramidal and smooth. As to flower-mercy, A. ulei was cited as 4-merous, but the synonymous Meiandra minor Mgf. was described as 5-merous; in the only available collection of A. ulei (Cuatrecasas 8847, from Florencia, Caquetá, Colombia), agreeing perfectly otherwise with the descriptions and type photograph (Macbride 17396), five petals are visible on each of three flowers and the ovary is definitely 3-locular. An isotype (NY) of A. maius (Mgf.) Mgf. ex Macbr. has been examined. The three El Valle (Colombia) collections of Alloneuron have been generic irritations for me during the last 15 years; the Ayacucho (Peru) specimens, with both flowers and fruit, provided the correlative spark.

The species of Alloneuron may be keyed as follows:

1. Leaf blades equally pinnate-veined throughout; cauline internodal pubescence stipitate-stellulate (strongly barbellate at the apex) or stellulate.
 2. Tree 30 m; leaf blades 5.5-9 cm wide..... A. maius
 2. Shrub to 1 m; leaf blades 1.5-3 cm wide..... A. ulei
1. Leaf blades with 5-7 strongly developed primary lateral

veins from below the lower $1/3$ of the blade; cauline internodal pubescence pinoid-squamate or squamate, the trichome bases protracted.

3. Leaf blades strongly plinerved, the inner pair of primary veins diverging 2-4 cm above the blade base.
4. Leaf blades subrigid, gradually acute at the apex; pubescence of lower leaf surface venules pinoid.....
..... A. cuatrecasasi
4. Leaf blades membranaceous, caudate-acuminate at the apex; pubescence of lower leaf surface venules squamulose.....
..... A. dudleyi
3. Leaf blades inconspicuously plinerved, the inner pair of primary veins diverging 0.3-1 cm above the blade base.
5. Leaf blades coriaceous, bullate above, broadly acute at the apex; panicle many-flowered, 13-17 cm long.....
..... A. bullatum
5. Leaf blades membranaceous, plane above, acuminate at the apex; panicle few-flowered, 2.5-4.5 cm long.....
..... A. subglabrum

ALLONEURON CUATRECASASII Wurdack, sp. nov.

A. bullato Wurdack affinis, foliis distinctius plinervatis basi acutis supra non bullatis differt.

Frutex; ramuli obscure rotundato-tetragoni sicut petioli foliorum venae primariae subtus pilis crassis paulo compressis 0.2-0.7 mm longis appressis inconspicue asperis ad basim paulo protractis persistentibus sparse vel modice armati. Petioli 1-1.5 cm longi; lamina 12-20 X 4.5-7.5 cm elliptica apice gradatim angustaque acuto basi anguste acuta, subrigida et integra, supra glabra, subtus sparsiuscule puberula pilis pinoideis erectis 0.05-0.1 mm longis, 5(-7)-plinervata pari interiore 2.5-4 cm supra basim subalternatim divergenti nervis secundariis 0.2-0.3 cm inter se distantibus subtus prominenter elevatis nervulis supra indistincte et subtus paulo elevatis (areolis ca. 1 mm latis). Panicula multiflora 11-12 X 9-10 cm modice appresso-setulosa pilis robustis usque ad 0.5 mm longis dense inconspicueque barbellatis; flores ignoti. Hypanthium fructiferum paulo (0.5 mm) pedicellatum ca. 2.5 mm longum extus sparsiuscule pilis pinoideis 0.1-0.2 mm longis praeditum; capsula infera 3-locularis; semina 0.7-0.8 X 0.2-0.25 mm pyramidata laevia.

Type Collection: J. Cuatrecasas 15565 (holotype F 1295178; isotypes NY, US), collected on the western slopes of the Cordillera Occidental, "hoya del río Sanquinini, lado izquierdo, La Laguna, bosques," Depto. El Valle, Colombia, elev. 1250-1400 m, 10-20 Dec. 1943.

Of the examinable (undehisced) fruits, two showed five external calyx teeth (stout, barbellate, non-projecting, ca. 0.3 mm long) and one had six calyx teeth.

ALLONEURON BULLATUM Wurdack, sp. nov.

A. dudleyi Wurdack affinis, foliis supra bullatis paulo

plinervatis ad basim obtusis vel rotundatis differt.

Ramuli rotundato-quadrangulati sicut petioli foliorum subtus venae primariae inflorescentiaque densiuscule appresso-setulosi pilis 0.5-1(-1.3) mm longis robustis ad basim paulo protractis paulo complanatis sub lente obscure muriculatis. Petioli 1.5-3 cm longi; lamina 9-14 X 5-9.5 cm late elliptica apice late obtuseque acuto basi obtusa vel rotundata, coriacea et essentialiter integra, supra primum sparse bullato-setulosa (setula ca. 0.2 mm longa mox caduca) demum glabra et reticulato-rugosa, subtus in nervis secundariis nervulis superficieque sparse setulosa pilis pinoideis plerumque 0.05-0.2 mm longis persistentibus, breviter 5-plinervata (pari exteriori inframarginali neglecto) pari interiore 0.4-1 cm supra basim divergenti nervis secundariis 0.2-0.3 cm inter se distantibus sicut nervis primariis tertiariisque supra impressis subtus prominenter elevatis areolis subtus ca. 1-1.5 mm latis. Panicula multiflora 13-17 X 9-17 cm; sepalorum limbus plerumque 5-dentatus, dentibus setiformibus ca. 0.6 mm longis; flores ignoti. Hypanthium fructiferum vix (0.2-0.5 mm) pedicellatum modice appresso-setulosum pilis pinoideis 0.1-0.6 mm longis; capsula 3-valvata, valvis ca. 2.5 mm longis; semina numerosa 1 X 0.2-0.3 mm pyramidata laevia.

Type Collection: J. Cuatrecasas 22475 (holotype F 1302175; isotypes F, NY, US), collected in "Cordillera Occidental, filo de la Cordillera, cerro sobre el Alto de Mira (entre Tabor y Carrizales)," Depto. El Valle, Colombia, elev. 2100-2350 m, 23 Oct. 1946. "Arbol. Hoja coriácea, concava, rugosa, ruda, verde oscura, mate en la haz, grisácea, verde clara envés." Vern. name: "Nigüito."

ALLONEURON DUDLEYI Wurdack, sp. nov.

A. cuatrecasasi Wurdack affinis, foliis tenuioribus plerumque angustioribus ad apicem caudato-acuminatis foliorum subtus venarum secundariorum pilis squamulosis compressis differt.

Frutex vel arbor 3-5(-8) m; ramuli sicut inflorescentiae axis foliorum subtus venae primariae secundariaeque sparse vel modice squamis 0.2-0.5(-1) mm longis ovatis vel lanceatis sub lente papillosis armati. Petioli 0.7-3 cm longi; lamina (acumine excluso) 7-19 X 2-4.5(-6.5) cm elliptica vel oblongo-elliptica apice longiuscule (1-2 cm) angusteque acuminato basi acuta, membranacea et integra, supra costa excepta glabra, subtus in venulis sparse squamuloso-strigulosa (pilis ca. 0.1-0.15 X 0.05-0.07 mm) et in venarum primariorum exteriorum axillis sparse obscureque robusto-setulosa (pilis ca. 0.5-1 X 0.1 mm), 7-plinervata pari exteriori tenuiore inframarginali pari interiore 2-4 cm supra basim divergenti venulis subtus planis densiuscule reticulatis (areolis ca. 0.3 mm latis). Panicula 9-10 cm longa multiflora; flores haplostemoni 5-6-meri sessiles in ramulorum brevium extremitatibus multiglomerati, bracteolis non visis, alabastris maturis fructibusque solum cognitis. Hypanthium (ad torum) ca. 2.4 mm longum extus

dense setulis appressis 0.4-0.7 mm longis teretibus minute barbellatis indutum; calyx in alabastris ca. 0.6 mm altus clausus (apice dentibus exterioribus setuliformibus armato) demum ca. 0.1 mm supra torum dehiscens. Petala glabra ca. 1.3 X 0.9 mm ovata apice hebeti-acuto. Filamenta ca. 0.6 mm longa glabra; antherarum thecae 0.9 X 0.5 X 0.5 mm late oblongae, appendice dorsali 0.3 X 0.3 mm descendente hebeti-acuta. Stigma punctiforme; stylus glaber; ovarium 3-loculare omnino inferum apice glabro 6-costato. Capsula trivalvis; semina numerosa 0.7 X 0.3-0.35 mm pyramidata laevia.

Type Collection: M. T. Madison 10101 (holotype US 2585577A; isotype NA), collected in "cloud forest in full sun at Camp 2 $\frac{1}{2}$ on the east side of the Rio Apurimac across from the Hacienda Luisiana," 73° 38' W, 12° 38' S, Cordillera Vilcabamba, Prov. Convención, Depto. Cuzco, Peru, elev. 1730 m, 20 June 1970. "Tree to 4-5 m tall, erect then spreading, with flat crown; leaves glossy green, midrib scurfy; calyx light green with white hairs."

Paratypes: T. R. Dudley 10385, 10389 and Madison 10181, all topotypical and sterile; Dudley 11927 (fruiting) and Madison 10259 (sterile), from between Huanhuachayo and Punccho, ca. 30 km SW of Hacienda Luisiana, eastern massif of Cordillera Central opposite Cordillera Vilcabamba, Prov. La Mar, Depto. Ayacucho, Peru, 21 Aug. 1968.

Of the six buds dissected (all with 3-celled ovaries), four were 6-merous and two were 5-merous. The petal and filament dimensions are surely somewhat greater in flowers at anthesis.

ALLONEURON SUBGLABRUM Wurdack, sp. nov.

A. dudleyi Wurdack in trichomatum forma affinis, foliis subsessilibus minus plinervatis paniculis paucifloris differt.

Ramuli teretes sicut petioli laminarum venae primariae supra et subtus inflorescentiaque sparse vel sparsissime (in nodis modice) strigulosi pilis 0.1-0.6(-1) mm longis paulo compressis crassis sub lente basim versus imperspicue papillosis ad basim paullulo protractis. Petioli 0.2-0.4 cm longi; lamina 5.5-9(-12) X 2.5-5 cm oblongo-ovata apice gradatim obtuseque acuminato basi rotundata et inconspicue auriculata, integra et distanter appresso-ciliolata, ubique in superficie glabra, subtus secus venas primarias sparsissime setulosa pilis ca. 0.7-1 X 0.15-0.2 mm robustis laevibus et secus venulas sparsissime caduceque pilis pinoideis 0.03-0.05 mm longis armata, breviter 5-plinervata pari interiore 0.3-0.5 cm supra basim divergenti nervis secundariis 0.3-0.5 cm inter se distantibus nervulis subtus planis areolis ca. 0.3-0.5 mm latis. Panicula pauciflora 2.5-4.5 cm longa, ramulis ultimis 1-3-floris; flores haplostemoni 4-5-meri, pedicellis 0.5 mm longis. Hypanthium (ad torum) 1.3 mm longum extus sparse strigulosum pilis ad basim densiuscule asperis; calycis vestigium ad anthesim subtruncatum ca. 0.2-0.3 mm longum. Petala ca. 2 X 0.7 mm oblongo-lanceata acuta extus sparse granulosa. Antherarum thecae 0.5-0.6 X 0.4-0.5 mm, minute uniporosae; appendix dorsalis 0.3 X

0.3 mm hebeti-acuta. Stigma punctiforme; stylus glaber; ovarium 3-loculare omnino inferum glabrum. Capsula (2-)3-locularis, valvis ca. 2 mm longis; semina 0.6-0.7 X 0.25 mm pyramidata laevia.

Type Collection: J. Cuatrecasas 15764 (holotype US 2338630; isotypes F, NY), collected at "Costa del Pacifico; rio Yurumguí: veneral, bosques," Depto. El Valle, Colombia, elev. 5-50 m, 29 Jan. 1944. "Arbol mediano. Hoja cartaceo-herbacea, color verde grisaceo medio. Corteza delgada, ocraceo-palida. Madera amarillo-ocracea, dura." Vern. name: "Mora."

CLIDEMIA RUBRA (Aubl.) Mart. and allies

As is evident from the comments and classifications of previous workers in the melastomes, the complex of species around spp. 40-46 of Cogniaux' monograph is a taxonomically recalcitrant group; both Naudin (Ann. Sci. Nat. ser. 3 Bot. 17: 331-332. 1852) and Gleason (Brittonia 3: 132. 1939) discussed the vegetative and floral variability. The floral details (especially the hypanthial, toral, and ovarial pubescence) recently have been examined by me on several hundreds of collections, with only a few useful features adduced. Omitted from the present discussion are C. ulei Pilger and C. uribei Wurdack (which are reasonably distinct units) and C. aphanantha Sagot, C. micrantha Sagot, and C. francavillana Cogn. (inadequately known, with few or no topotypical recent collections). Also not considered is C. microthyrsa R. O. Williams (with longish-pedicellate larger flowers); Irwin et al 54496 and 55152 from Suriname, as well as Krukoff 11822 from Maranhão, Brazil, are tentatively referred here. The C. rubra complex in Venezuela may be keyed as follows:

1. Petals each with an external infra-apically inserted glandular setula 0.4-0.8 mm long; ovary apex glabrous..... C. monantha
1. Petals glabrous; ovary apex usually setulose.
 2. Petioles less than 1 cm long.
 3. Hypanthial hairs in part gland-tipped; ovarial hairs sparse, 0.1-0.2(-0.3) mm long..... C. rubra
 3. Hypanthial hairs eglandular; ovary usually densely setulose with hairs 0.5-1 mm long..... C. sericea
 2. Petioles (1.5-)2-6 cm long.
 4. Leaf blades attenuate to the base, distinctly plinerved.. C. attenuata
 4. Leaf blades rounded to cordulate at the base, basally nerved or indistinctly (to 0.5 cm) pseudoplinerved.
 5. Inflorescence axis not or scarcely (less than 0.5 cm) evolved..... C. debilis
 5. Inflorescence axis distinct, 1-6 cm long..... C. fendleri

CLIDEMIA MONANTHA L. Wms.

This recently described species is well characterized by

the distinctly petiolate leaves (with rounded blade bases and basal primary veins), petals each with a subapical gland-tipped setula, and glabrous ovaries. Most of the Venezuelan specimens and one Costa Rican collection have some of the hypanthial hairs gland-tipped, but otherwise C. monantha is quite uniform. The species ranges from Mexico (Cerro San Martín, Vera Cruz, Sallé & n., BM), Honduras (Cortes, Molina 11431; Olanchó, Molina 8454), Nicaragua, Costa Rica (Guanacaste, Schnell 371; San Ramon, Tonduz 17842, Brenes 14296 and 14300), Panama (Panama, Cerro Azul, Duke 9335), and Venezuela (Carabobo, Falcon, Lara, Miranda, Yaracuy).

CLIDEMIA RUBRA (Aubl.) Mart.

The Aublet type (BM) shows the largest leaves with petioles ca. 0.5 cm long and narrowly ovate blades 8 X 4.5 cm (rounded at the base, not or scarcely plinerved), as well as hypanthial hairs in part gland-tipped; reasonably good vegetative matches (also with gland-tipped hypanthial hairs) are Tutin 619 (BM) and Schomburgk 95(98) (BM, P, W). Of the synonyms cited by Cogniaux, Melastoma sessiliflora Vahl (C), C. heteromalla D. Don (OXF), and Sagraea cognata Steud. (W) agree with the Aublet concept; to this synonymy should be added C. platyphylla (Naud.) Cogn., the Ferreira holotype (P) of which is well matched by Schomburgk 648 (P). As thus restricted, the species is known by recent collections from eastern Colombia (Amazonas, Schultes & Lopez 16441 and 16443; Meta, Hermann 11203), Venezuela (Amazonas), Guyana (de la Cruz 1758, 2470, 3987; Graham 233; Hitchcock 17149), Suriname (Maguire & Stahel 25039), French Guiana (Broadway 161), Brazil (Amazonas, Fromm 1420, Santos 1468, Sota 13063; Pará, Spruce 776), Peru (Loreto, Martin & Lau-Cam 1197, Ferreira 7847, Killip & Smith 29213, Dodson 2817), and Bolivia (Mapiro region, Buchtien 989, 990, 1716), but not Central America.

CLIDEMIA SERICEA D. Don

Among the Cogniaux-cited synonyms not here placed under C. rubra (vide supra), Don's binomial is the oldest available one. Here belongs also Sagraea columnaefolia DC. (holotype M). The varieties described by Naudin, Cogniaux, S. Moore, and Hoehne under C. rubra are for a monographer to evaluate and transfer. As defined here, a vegetatively extraordinary welter remains; a few of the collections (Oersted 2831 and Schnell 500, from Costa Rica; Stern, Eyde, & Ayensu 1954 and Davidson 676, from Chiriquí, Panama; Haught 5278, from Cauca, Colombia; Delgado 250, from Cerro Avila, Venezuela) have nearly or quite glabrous ovary apices, but vegetatively fall within C. sericea sens. lat. From notes made in London, the holotype (BM) of Melastoma verticillata Miller is well matched by Philipson 2371 and Linden 1155; the use of Miller's epithet is preempted in Clidemia.

CLIDEMIA ATTENUATA (Naud.) Cogn.

Because of the basally attenuate distinctly plinerved leaf blades with distinct petioles and non-glandular hypanthial hairs, C. attenuata has been maintained as a species, (but with no real conviction), good matches for the Finlay type (P) being Cowan & Wurdack 31544 (Amazonas, Venezuela) and A. C. Smith 3306 (Kanuku Mountains, Guyana); Webster & Miller 9953, from Trinidad, perhaps also belongs here. Urban (*Symb. Ant.* 3: 47-48. 1902) noted that the Finlay collections at Paris, purportedly from "St. Thomas", were probably collected in Trinidad. In the Flora of Trinidad & Tobago, R. O. Williams synonymized C. attenuata under C. rubra. In Central America, a vegetatively rather similar population occurs (the petioles somewhat shorter, the blades usually smaller), but the ovaries are glabrous (Mexico, Reko 3583; Honduras, Williams & Williams 18344, Molina & Molina 14129, Molina 10095, Meyer 9923; Costa Rica, Skutch 2260; Panama, Blum & Godfrey 1736, Correa & Dressler 465).

CLIDEMIA DEBILIS Crueg.

As indicated in the Flora of Trinidad & Tobago, C. bonplandii (Naud.) Cogn. is synonymous with C. debilis. The species is known from Trinidad, Venezuela (D. Federal, Bolívar), and Brazil (Ceará, Pernambuco, Bahia). Because of the distinctly plinerved leaf blades and glandular-setulose hypanthia in C. aphanantha Sagot, I still have reservations about following R. O. Williams with a further synonym under C. debilis.

CLIDEMIA FENDLERI Cogn.

Clidemia guaicaipurana Pittier, Bol. Soc. Venez. Cienc. Nat. 11: 21. 1947.

Clidemia rubella Pittier, Bol. Soc. Venez. Cienc. Nat. 11: 22. 1947.

?Clidemia rariflora (Bonpl.) Cogn., DC. Mon. Phan. 7: 1017. 1891 (non C. rariflora Benth., Hook. Journ. Bot. 2: 308. 1840).

The type collection of C. fendleri (BR, K, NY) has eglandular or very sparsely gland-tipped hypanthial hairs, but more recent collections have varying proportions of such glandular trichomes. The holotype (P) of C. rariflora (Bonpl.) Cogn. has short (0.3-0.5 mm) cauline pubescence, nearly glabrous (except for the minute glands) upper leaf surfaces, and lower leaf surfaces with the setulae mostly confined to the primary and secondary veins; however, in other features (pubescence quality, fine leaf venulation, glandular-setulose hypanthia, inflorescence form), it conforms at least specifically to C. fendleri. Until topotypical material is collected to fix the variability limits, no subspecific recognition seems warranted for the "Cumaná" plants. Despite Cogniaux' monograph separation, C. fendleri is certainly very close to C. debilis, differing in the more evolved inflorescences.

CLIDEMIA SALIUENSIS Wurdack, sp. nov.

Sect. Sagraea. C. amplae Cogn. affinis, foliis angustioribus floribus bene pedicellatis petalis staminibusque paulo minoribus calycis dentibus exterioribus longioribus differt.

Ramuli primum obtuse quadrangulati demum teretes sicut petioli foliorum venae primariae secundariaeque subtus inflorescentia hypanthiaque densiuscule puberuli pilis stellulato-pinoideis 0.1-0.15 mm longis. Petioli (1-)2-4 cm longi; lamina (7-)12-17 X (2.5-)5-7.5 cm anguste ovato-elliptica apice gradatim acuminato basi obtusa, firme membranacea et integra, distanter obscureque appresso-ciliolata, supra primum sparse appresso-arachnoidea demum glabrata, subtus in venulis resinoso-granulosa in superficie glabra, 5-nervata nervis secundariis plerumque 3-4 mm inter se distantibus venulis subtus planis dense reticulatis (areolis 0.2-0.3 mm latis). Inflorescentiae pauciflorae in foliorum superiorum axillis oppositis plerumque solitariae, axe plerumque 2-4 cm longo, bracteolis minutis ad pedicellorum bases insertis, pedicellis ca. 4 mm longis gracilibus; flores 4-meri. Hypanthium (ad torum) 2.2 mm longum teres sparse pilis simplicibus gracilibus laevibus 0.2-0.3 mm longis setulosum et sparse verruculosum; calyx 0.3 mm longus paullulo (0.1 mm) 4-lobatus, dentibus exterioribus subulatis ca. 0.7 mm eminentibus; torus sparsiuscule glanduloso-puberulus (0.1 mm). Petala 1-1.2 X 0.7-0.8 mm oblonga glabra (apice late obtuso), extus mucrone unico ca. 0.2-0.3 mm longo infra-apicali ornato. Stamina glabra; filamenta (paulo immatura) 1.1 mm longa; antherarum thecae 1.5-1.6 X 0.3 X 0.3 mm anguste oblongae, poro minuto dorsaliter inclinato; connectivum ca. 0.4 mm prolongatum exappendiculatum. Stigma punctiforme; stylus glaber 4 X 0.3-0.15 mm in ovarii collo 0.3 mm immersus; ovarium 4-loculare et 2/3 inferum, apice lobulato setulis ca. 10 gracilibus 0.15-0.3 mm longis ornato.

Type Collection: J. A. Steyermark 94404 (holotype US 2574443; isotypes US, VEN), collected in virgin wet forest between Colonia Tovar-Junquito road and Hacienda El Limón 10-15 km below junction of Junquito-Colonia Tovar road, Distrito Federal, Venezuela, elev. 1300-1500 m, 12 Oct. 1965. "Shrub 2.5 m; leaves dark green above, yellow-green below with buff-tawny elevated nerves; flowers on old wood as well as young leafy stems; hypanthium greenish-gray; petals, filaments, and style white; fruit globose, purple, 4-5 mm diam."

Clidemia ampla has longer (ca. 0.5 mm) cauline pubescence, leaf blades ca. 2/3-3/4 as wide as long (12-20 cm wide), sessile flowers, petals 2 mm long, anther thecae ca. 2 mm long, external calyx teeth barely (0.2 mm) projecting, and stigmas slightly expanded. The general aspect (but not the floral details) of C. saltuensis is rather like that of the West Indian species groups around C. divaricata (Griseb.) Cogn.-C. trichotoma Griseb. (both with smaller and firmer leaf blades) and C. guadelupensis (DC.) Griseb. (with sharply tetragonal branchlets and plinerved leaf blades).

REVIEW AND COMMENTS ABOUT A THING

Otto & Isa Degener

Between August 2 and 31, 1967, with the help of a \$5,000 grant from the National Park Service, The Nature Conservancy sponsored a scientific expedition into Kipahulu Valley, Island of Maui, Hawaiian Islands. Dr. Richard E. Warner, Foundation of Environmental Biology, Berkeley, California, was leader of about twenty scientists of various biological disciplines and a variable number of guides, *paniola and porters. The specialists in the main volunteered their services or their institutions lent these men for the expedition.

The Conservancy copyrighted the result of the study in 1968 under the title "Scientific Report of the KIPAHULU VALLEY EXPEDITION. Sponsored BY: THE NATURE CONSERVANCY. Edited By: Richard E. Warner, Ph. D. Expedition Leader." The 184 loose-leaf pages, measuring 8 1/2 by 11 inches, are bound in a Manilla cover. There is a panoramic photograph of the valley itself, eight of expedition members, about 49 showing beautifully the type of vegetation, three about the endemic "picture-winged" fruit flies, and four of close-ups of birds. In addition there are full-page maps of Kipahulu Valley showing expedition trails and locations of the three base camps; of soils; a topographic vegetation profile; and of vegetation respectively of the lower, the central, and the upper part of the valley.

Kipahulu Valley extends from sea level to 7,350 feet, more or less in a northwesterly direction, joining Haleakala National Park at its eastern end hundreds of feet above Paliku Cabin. The two mile wide valley funnels the trade winds. Its eight mile length is confined by two very steep ridges clothed largely with tapestry forests, here and there broken by shrubby ledges and some cliffs. The floor consists largely of two nearly parallel, sloping flats, the one about 700 feet higher than the other, especially toward the middle-makai end. This unusual geologic structure is explained by the formation eons ago of a deeply eroded valley on Haleakala Volcano's flank followed by a period of filling by lava flows. During quiescence of volcanic activity, one side of the partly filled valley was then badly eroded by the forerunner of Kaukauai Stream. With a fresh period of activity, this new valley within Kipahulu was partly filled with veneers of lava. Thus the higher flat, contrary to expectation, is much older than the lower one.

The lower reaches of the valley from a biotic standpoint are not too interesting, being pasture overgrown with lemon guava and other

*As Spaniards were the first cowboys in the Hawaiian Islands, paniola became the vernacular name for a man of this profession.

exotics. Nevertheless, geologically the area is locally interesting and delightful with the stream forming a series of pools - seven were "sacred" to the Hawaiians - of considerable fame but too profane for discussion in a botanical review.

The rest of the valley to the inversion layer at about 7,000 feet is a dense rainforest. Below a transition band between 3,000 and 4,000 feet, koa (Acacia) is the predominant tree; above, ohia lehua (Metrosideros) predominates, giving way mauka as the terrain becomes increasingly dry to such sclerophyllous shrubs as Dodonaea, Railliardia, Styphelia and Vaccinium. The summit slope is crowned with windy flats of the endemic bunchgrass (Deschampsia hawaiiensis f. haleakalensis (Skotts.) St. John (incorrectly identified as D. nubigena) interspersed here and there with endemic bracken (Pteridium aquilinum var. decompositum (Caud.) Tryon, Pellaea ternifolia (Cav.) Link native to the Hawaiian Islands as well as to the Andes, and the endemic Neurophyllodes tridens (Hillebr.) Deg. & Greenw.

Though terrestrial shrubs and herbs as well as lianes and epiphytes abound between 3,000 and 6,000 feet, the warm rainfall of perhaps 200 inches annually, augmented by abundant fog drip, stimulates bacterial decay and dissolution. As a result, the water-drenched soil is practically devoid of litter and exceptionally poor in saprophytic fungi. Above 6,000 feet, with less rainfall and cooler weather, the layer of litter can be two inches thick overlying three inches of humus. Saprophytic fungi are abundant, having available sustenance.

The Report contributes 13 pages to Ecological Conditions; 31 to Vascular Plants and Botanical Potential; 25 to Phytogeography; 3 to Climatology; 1 to Some Observations of the Biotic Factor under headings of pigs, rats, owls and birds [why "owls" are not included in the same category with "birds" is strange indeed]; 5 to Genetics, Evolution and Drosophila Ecology; 7 to other branches of Entomology; 15 to Mosses; 1 to Lakes of Eastern Haleakala; 3 to Mammals; and 16 to Birds, including the rediscovery of one considered extinct.

According to the bibliography given on page 86, the writers (except Mr. William J. Ho) followed some of the archaic plant determinations made by Dr. F.R. Fosberg (incorrectly spelled "Forsberg") for Island of Hawaii plants in Doty, M.S., & Mueller-Dombois, D., Atlas Bioec. Stud. Haw. Volc. Nat. Park. 1966. As one of the reviewers had been Ranger-Naturalist for Hawaii National Park (including Haleakala) in 1929 and both reviewers have lived in and about Haleakala - the kane in 1927 at the grassy head of Kipahulu would have dropped into a crevice of consolidated ash had he not instinctively stuck out his arms akimbo - to study and publish about its flora, they herewith add their opinions regarding the taxonomy given in the Report. Obvious typographical errors, superficially noticed,

needing correction are: Freycinetia, Liparis, Sadleria, Pteridophyta, Asplenium contiguum, Labordia, Lysimachia hillebrandii, Metrosideros, Cheirodendron trigynum, Grimmia haleakalae, Molkenboer, Monachus schauinslandi, Lasiurus and Plagithmysus.

PAGE	REPORT'S VERSION	DEGENER'S VERSION
15	" <u>Dubautia</u> sp." " <u>Pelea clusiaefolia</u> " (Recommendation 73G (c) of the Code.)	Mainly <u>Railliardia</u> sp. <u>P. clusiifolia</u> A. Gray
16	" <u>Lycopodium cernuum</u> " " <u>Anectochilus</u> s." " <u>Trematolobelia macrostachys</u> " " <u>Dicranopteris linearis</u> "	<u>L. c.</u> var. <u>crassifolium</u> Spr. <u>Odontochilus sandwicensis</u> (Lindl.) Benth. & Hook. <u>T. sandwicensis</u> Deg <u>D. l.</u> var. <u>maxima</u> Deg. & Deg.
19	" <u>Erechtites valerianaeifolia</u> " " <u>Nertera depressa</u> "	<u>E. valerianifolia</u> (Wolf) DC. <u>N. granadensis</u> var. <u>insularis</u> Skottsberg.
20	" <u>Vaccinium berberidifolium</u> " (As <u>V. penduliflorum</u> var. <u>berberifolium</u> A. Gray was raised by Skottsberg to a species, we see no reason to change the orthography to " <u>berberidifolium</u> .")	<u>V. berberifolium</u> (A. Gray) Skottsberg.
25	" <u>Hypochaeris radicata</u> " " <u>Psilotum complanatum</u> " " <u>Psilotum nudum</u> "	<u>Hypochaeris</u> r. <u>P. c.</u> var. <u>oahuensis</u> (Muel-ler) Deg. & Deg. <u>P. n.</u> forma <u>fosbergii</u> Deg. & Deg.
26	" <u>Ophioglossum pendulum</u> ssp. <u>falcatum</u> "	<u>Ophioderma falcatum</u> (Presl) Deg.
27	" <u>Callistopteris baldwinii</u> " " <u>Vandenboschia draytoniana</u> "	<u>Macroglena toppingii</u> Deg. & Deg. <u>Crepidopteris draytonianum</u> (Brack.) Deg. & Deg.
28	" <u>Sphenomeris chinensis</u> "	<u>S. chusana</u> (L.) Copel.
29	" <u>Cyclosorus goggilodus</u> "	<u>C. gongylodes</u> (Schkuhr) Link
	(That Schkuhr's orthography in text and index is " <u>goggilodus</u> " and on his plate " <u>goggylodus</u> " indicates carelessness by author or printer. Both spellings are meaningless, unintentional errors. Following the Code, we consider correction of the errors to " <u>gongylodes</u> ," an authentic Latin adjective meaning "roundish," proper.)	
	" <u>Cyrtomium boydiae</u> " (Because of venation, this fern hardly belongs in the genus <u>C.</u>)	? <u>boydiae</u>
	" <u>Dryopteris keraudreniana</u> "	<u>Toppingia keraudreniana</u> (Gaud.) Deg., Deg. & A.R. Smith
30	" <u>Elaphoglossum alatum</u> var. <u>parvisquameum</u> "	<u>E. parvisquameum</u> Skottsberg.
36	" <u>Peperomia ligustrina</u> var. <u>copuolana</u> "	<u>P. l.</u> var. <u>oapuolana</u> Yuncker

PAGE	REPORT'S VERSION	DEGENER'S VERSION
	" <u>Peperomia lilifolia</u> var. <u>nudilimba</u> " (Recommendation 73G (c) of the Code.)	P. <u>lilifolia</u> var. <u>n.</u>
37	" <u>Phytolacca sandwicensis</u> Endl." (Endlicher's binomial is a nom. nud.)	P. <u>brachystachys</u> Moq.
38	" <u>Fragaria chiloensis</u> "	F. <u>c.</u> var. <u>sandwicensis</u> (Decaisne) Deg. & Deg.
39	" <u>Geranium arboreum</u> "	<u>Neurophyllodes arboreum</u> (A. Gray) Deg.
	" <u>Geranium multiflorum</u> var. <u>ovatifolium</u> "	<u>Neurophyllodes ovatifolium</u> (A. Gray) Deg. & Greenw.
	" <u>Pelea clusiaefolia</u> "	P. <u>clusiifolia</u> A. Gray
41	" <u>Eugenia sandwicensis</u> "	<u>Syzygium sandwicense</u> (A. Gray) Ndz.
	" <u>Jussiaea suffruticosa</u> var. <u>lingustraeifolia</u> "	J. <u>s.</u> var. <u>ligustrifolia</u> (HBK) Griseb.
42	" <u>Myrsine lessertiana</u> "	<u>Rapanea lessertiana</u> (A. DC.) Deg. & Hosaka
	" <u>Myrsine sandwicensis</u> var. <u>mauiensis</u> "	<u>Rapanea s.</u> var. <u>m.</u> (Lév.) Deg. & Deg.
	" <u>Alyxia olivaeformis</u> "	A. <u>oliviformis</u> Gaud.
	" <u>Gouldia hillebrandii</u> Forsberg [sic] (Since 1937, the year of Dr. Fosberg's monograph (Bull. Bish. Mus. 147:1-82.), the genus <u>Gouldia</u> has been extensively revised by Skottsberg, Wilbur and the Degeners. The identification of the Kipahulu collection cannot be made with the 1937 key.)	var. <u>hillebrandii</u>
46	" <u>Cyanea grimesiana</u> var. ?"	C. <u>g.</u> (probably) var. <u>lydgatei</u> Rock
47	" <u>Lobelia grayana</u> "	<u>Neowimmeria grayana</u> (E. Wimm.) Deg. & Deg.
	" <u>Lobelia hypoleuca</u> "?	<u>Neowimmeria hypoleuca</u> ? (Hillebr.) Deg. & Deg.
	" <u>Dubautia demissifolia</u> "	<u>Railliardia demissifolia</u> Sherff
48	" <u>Dubautia montana</u> var. <u>robustior</u> "	<u>Railliardia montana</u> var. <u>robustior</u> Sherff
	" <u>Dubautia thyrsiflora</u> "	<u>Railliardia thyrsiflora</u> Sherff
	" <u>Erechtites valerianaefolia</u> "	E. <u>valerianifolia</u> (Wolf) DC.
53	(We wish to emphasize that <u>Trematolobelia macrostachys</u> of Kauai does not occur on Maui; the plant is <u>T. sandwicensis</u> or a close relative.)	
107	" <u>Campylopus boswellii</u> "	<u>Campylopus boswellii</u> (C. Mueller) Paris
	" <u>Racomitrium</u> "	<u>Rhacomitrium</u>
	(It is true that Bridel spelled originally his new genus " <u>Racomitrium</u> " as Mr. Hoe gives it. We consider this an ortho-	

- PAGE graphic error for which the Code under Recommendation 73A requires correction. The proper spelling is "Rhacomitrium" in keeping with such generic names as Rhacocarpus, Rhacopilum, etc.)
- 123 (The kane reviewer deposited about 1927 in some herbarium Viola mauianensis H. Mann from the edge of a bog-like pond. It is strange it was not collected by the Expedition.)
- 126 (Pigs: When Astelia species are terrestrial, feral pigs feed on the rhizomes and young leaves, often destroying the colonies. They also penetrate the higher stretches of cinder-covered terrain where the endemic bracken can survive with its underground rhizomes to the exclusion of other vascular plants. Pigs, with great ease, root out the rhizomes from the friable ash, pumice and cinders for food.)
- (Rats: Though certainly not in the Islands previous to the coming of the Polynesians in their huge double canoes, the Polynesian rat (Rattus exulans var. hawaiiensis Ellerman) in the eating of the orange, fleshy bracts and later of the sticky, ripe inflorescences of the Freycinetia have certainly aided the endemic crow (Corvus tropicus Gmelin) - now extinct except for one bird in captivity and perhaps a dozen wild on the Island of Hawaii - pollinate and later disseminate this liane.)
- 129 (The rediscovery of the Maui nukupuu bird (Hemignathus lucidus var. affinis Rothschild) and the sighting of the Maui parrotbill (Pseudonestor xanthophrys Rothschild) is not only of importance ornithologically, but of major importance botanically. The first bird was last seen in 1896; and the second probably in 1928, if we can believe the report of a sighting in neighboring Kaupo Gap by a surveying party. Many drepaniid birds, all endemic to the Archipelago, have evolved bills beautifully curved to penetrate the curves of mints, lobelias of many genera, and Camphusia for nectar. According to W.E. Banko (Condor 73:121. 1971.), a member of the Expedition, "Preservation of the ecological integrity of Haleakala's windward forest is thus of paramount importance to the survival of at least three, and possibly as many as six, Hawaiian birds."

One of the main objectives of the expedition was "to prepare a report of the findings for the Nature Conservancy and the U.S. Department of Interior, including recommendations for acquisition, use, and longterm conservation of the area." The part about birds and picture-winged Drosophila, we believe, will be arguments for politicians and intelligent laymen alike to conserve the area under the wing of the National Park Service. These are precisely the individuals who, with contacts and funds, can best implement a project to a successful conclusion. But the botanical part of the report is sorely disappointing and not of much help. No striking plant, like a striking bird, was noted as threatened with extinction even though many, many kinds belong in this category! It took Dr. St. John only until April 1970 to describe and illustrate over a dozen novelties from the area (See Pac. Sci. 25:39-79. 1971.) such as: Panicum lamiatile, Panicum lustriale, Peperomia kīpahuluensis, Pelea anapanapaensis, Pelea clusii-

folia var. minor, Pelea c. var. m. t. stenophylla, Pelea kipahulu-
ensis, Lysimachia spathulata, Clermontia rosacea, Cyanea bicolor,
Cyanea haleakalaensis, Argyroxiphium forbesii, Argyroxiphium vires-
cens var. paludosa, Lagenophora viridis and Railliardia demissi-
folia var. dolichophylla. Further botanical exploration will un-
doubtedly uncover many more plants new to Science.

Had the importance of plants been stressed as much as of birds and insects, would not the report have been more effective? According to a local newspaper article dated April 3, 1971, " - - - the Nature Conservancy in three years raised \$1.2 million to buy 4,000 acres in Kipahulu Valley to add to Haleakala National Park on the promise the State would add 5,000 acres to it. So far, the land has not been signed over by Gov. John A. Burns. And the lack of action is holding up a further fund-raising effort which the Nature Conservancy hopes will add 400 more acres to the park." Nero played on his Stradivarius while Rome burned to destruction. Will History repeat itself, and Kipahulu be destroyed?

The present reviewers are confused as to what they have reviewed. The 184 illustrated and bound pages have been copyrighted (not patented nor registered), are available in some local libraries, and have been distributed to various interested individuals. Some, not all, copies bear an an insertion claiming that the Report is not a publication! Being neither fish, flesh, fowl nor good red herring, what is this thing?

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XVII

Harold N. Moldenke

CALLICARPA L.

Additional & emended bibliography: Gamble, Man. Indian Timb., ed. 1, xxvii, 281--283, & 503. 1881; Trimen, Journ. Ceylon Br. Roy. Asiat. Soc. 9: [Syst. Cat. Flow. Pl. Ceylon] 68. 1885; C. K. Schneid., Illustr. Handb. Laubholz. 2: 587 & 591--594, fig. 384 c--i & 385 b--l. 1911; J. C. Willis, Rev. Cat. Indig. Flow. Pl. Ceylon 69. 1911; E. D. Merr., Philip. Journ. Sci. Bot. 12: 108, 298--301, & 382. 1917; W. H. Br., Merr., & Yates, Philip. Journ. Sci. Bot. 12: 240. 1917; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 603--606 (1927) and ed. 2, 603--606. 1928; Yamamoto, Journ. Soc. Trop. Agr. Formos. 6: 554--555. 1934; Kosterterm., Reinwardtia 1: 86 & 106. 1951; T. M. Simpson, Gard. South. Afr. 189. 1964; Garibaldi Accati, Atti Giorn. Stud. Prop. Spec. Legn. Pisa 1964/1965: 145--154, 1966; Anon., Hortic. Abstr. 36: 805. 1966; Moldenke, Phytologia 21: 328--348. 1971.

CALLICARPA AMERICANA L.

Additional bibliography: Moldenke, Phytologia 21: 329. 1971.

Additional citations: VIRGINIA: Fort Monroe: Chickering s.n. [Sept. 20, 1879] (W--2605969). TEXAS: Dallas Co.: J. Reverchon s.n. [Dallas, May-June 1876] (W--2607188).

CALLICARPA ANGUSTIFOLIA King & Gamble

Additional bibliography: Moldenke, Phytologia 21: 329 & 330. 1971.

The species has been collected in fruit in November.

Additional citations: MALAYA: Selangor: Nur 34369 (W--2608337).

CALLICARPA ARBOREA Roxb.

Additional & emended bibliography: Wall., Numer. List "49" [=50]. 1829; Gamble, Man. Indian Timb., ed. 1, xxvii, 282, & 503. 1881; Moldenke, Phytologia 21: 330, 336, & 346. 1971.

Jackson (1893) credits a "Callicarpa arborea Wall." to "Wall. Cat. n. 1826, partim" and reduces it to synonymy under C. vestita Wall. Actually, Wallich proposed no such homonym. In the reference cited he plainly accredits C. arborea to Roxburgh, citing 7 specimens for what he regarded as the typical form of the species, and then proposes a variety which he designated "♀ vestita". It is certainly the latter taxon to which Jackson refers.

CALLICARPA FORMOSANA Rolfe

Additional & emended bibliography: W. H. Br., Merr., & Yates, Philip. Journ. Sci. Bot. 12: 240. 1917; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 603 (1927) and ed. 2, 603.

1928; Moldenke, *Phytologia* 21: 332--334 & 346. 1971.

Emended illustrations: T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 603 (1927) and ed. 2, 603. 1928.

Brown, Merrill, & Yates (1917) record this species from Volcano Island in the Philippines.

CALLICARPA LONGIFOLIA Lam.

Additional & emended bibliography: Gamble, Man. Indian Timb., ed. 1, 282 & 503. 1881; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 604 (1927) and ed. 2, 604. 1928; Moldenke, *Phytologia* 21: 329--331, 333--335, 340, & 344. 1971.

Dop (1932) that his *C. tonkinensis* is closely related to *C. longifolia*, but differs in the shape of its leaf-blades (elliptic or slightly obovate), the whitish tomentum on the lower leaf-surface, the always glabrous corollas, the stamens not as long-exserted, and the drupes being only 1.5 mm. wide.

CALLICARPA LONGIFOLIA f. FLOCCOSA Schau.

Additional bibliography: Moldenke, *Phytologia* 21: 155--162 & 344. 1971.

Additional citations: MALAYA: Pahang: Nur 32651 (W--2608361).

CALLICARPA LONGISSIMA (Hemsl.) Merr.

Additional & emended bibliography: T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 604 (1927) and ed. 2, 604. 1928; Moldenke, *Phytologia* 21: 336. 1971.

Emended illustrations: T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 604 (1927) and ed. 2, 604. 1928.

CALLICARPA MACROPHYLLA Vahl

Additional & emended bibliography: Gamble, Man. Indian Timb., ed. 1, 282, 283, & 503. 1881; Moldenke, *Phytologia* 21: 336, 341, & 345. 1971.

CALLICARPA OBLANCEOLATA Urb.

Additional bibliography: Moldenke, *Phytologia* 21: 347--348. 1971.

The *G. C. Bucher* 1024 and *Herb. Roig* 7604, distributed as *C. oblanceolata*, are actually *C. areolata* Urb.

In all, 114 herbarium specimens, including the type, and 4 mounted photographs of *C. oblanceolata* have been examined by me.

Additional citations: CUBA: Oriente: *Acuña* 12691 (Es, W--1881247), 12692 (Es, N, W--1881248), 12693 (Es, Es, N, W--1881249), 12694 (Es, N, W--1881250), 12695 (Es, W--1881251), 12696 (Es, Ml, N, W--1881252), 13323 (Es, N), 13324 (Es, N), 13325 (Es, N), 13328 (Es, N), *s.n.* [*Herb. Roig* 8754] (Rg), *s.n.* [*Herb. Roig* 8766] (Rg), *s.n.* [April 16, 1945] (Ml); *Alain* 3220 (Z); *Alain, Clément, & Chrysogone* A.1029 (N); *Mrs. G. C. Bucher* 100 (N), 100a (N), 100aa (N), 100b (N), 100bb (N), 100c (N), 100d (N), 100e (N), 100f (N), 100g (N), 100h (N), 100i (N), 100j

(N), 100k (N), 100 L (N), 100m (N), 100n (N), 100p (N), 100q (N), 100r (N), 100s (N), 100t (N), 100u (N), 100v (N), 100w (N), 100x (N), 100y (N), 100z (N), 140 [Herb. Roig 8154] (N, Rg, Rg, Rg), 11051 (Es, Es), 11459 (Es), s.n. [Moa, 1939] (Ha); Clément 3583 (Ha, N, Vi), 4122 (Ha); Clément & Alain 3919 (Ha, N); Clément, Alain, & Chrysogone 3919 (Vi), 3925 (Vi); Clément & León 5482 (N); Ekman 3837 (N); R. A. Howard 5900 (N, N); León 20103 (N), 20196 (N), 21155 (Ha, N), 21301 (Ha, N); León & Clément 20103 (Ha, Ha), 20196 (Ha, N), 23055 (N), 23128 [July 1949] (N), 23147 (N), 23298 (N), 23300 (N); León, Clément, & Alain 3925 [Clément & Alain 3925] (Ha, N); León, Clément, & Nestor 5402 (Ha), 5502 (Ha), 5593 (Ha); León & Victorin 20691 (Ha, N), 20941b (Ha); León, Victorin, & Clément L.20691 (Es); Marie-Victorin & Clément 21729 (Um--25253), 21731 (Um--25252, Um--25274); Marie-Victorin, Clément, & Alain 21564 (Um--25265); Victorin, Alain, & Clément 21564 (Ha); G. L. Webster 3763 (Mi).

CALLICARPA OBTUSIFOLIA Merr., Philip. Journ. Sci. Bot. 14: 451—452. 1919.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 14: 451—452. 1919; E. D. Merr., Enum. Philip. Pl. 3: 387. 1923; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Alph. List Common Vern. Names 3. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87. 1942; Moldenke, Phytologia 2: 95. 1945; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 141 & 177. 1949; Moldenke, Résumé 183 & 444. 1959; Moldenke, Phytologia 21: 153. 1971.

Merrill's original (1919) description of this species is as follows: "A shrub, the branchlets, petioles, inflorescences, and lower surface of the leaves densely and uniformly cinereous-stellate-pubescent, the indumentum covering the entire surface. Branches terete, pale brownish, glabrous. Leaves elliptic to oblong-elliptic, subcoriaceous, 5 to 8 cm long, 2.5 to 4 cm wide, the apex rounded, obtuse, or sometimes subacute, base usually obtuse, margins entire below, in the upper part distinctly denticulate, the upper surface brownish-olivaceous, glabrous or when young stellate-pubescent along the midrib; lateral nerves 5 to 7 on each side of the midrib, curved, distinct as are the primary reticulations; petioles 5 to 10 mm long. Cymes axillary, peduncled, dichotomous, up to 2.5 cm wide, the peduncles about 1.5 cm long; bracts linear-lanceolate, acuminate, 2 to 2.5 mm long; pedicels 0.5 mm long or less. Flowers rather crowded, pink. Calyx cup-shaped to obconic, about 1.6 mm long, densely stellate-pubescent, the teeth 4, short. Corolla glabrous, 2.5 mm long, the lobes equal, orbicular-ovate, rounded, nearly 1 mm in diameter. Filaments and style 5 to 6 mm long. Fruit globose, dark-brown and rugose when dry, about 2 mm in diameter."

The type was collected by Maximo Ramos [Herb. Philip. Bur. Sci. 32921] at Burgos, in Ilcos Norte Province, Luzon, Philippine Is-

lands, on July 27, 1918, growing in dry thickets at low altitudes, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, now lamentably destroyed. Merrill (1919) records the vernacular name "anayop" and notes that "The alliance of this species is manifestly with Callicarpa biancoi Rolfe, from which it is especially distinguished by its elliptic to oblong-elliptic, usually rounded or obtuse, never acuminate leaves."

The species is known thus far only from the original collection.

CALLICARPA OLIGANTHA Merr., Philip. Journ. Sci. Bot. 13: 155—156. 1918.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 13: 155—156. 1918; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 25 & 26. 1921; Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16 & 44—45, pl. 3. 1932; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56 & 87 (1942) and [ed. 2], 131 & 177. 1949; Moldenke, Alph. List Cit. 3: 727. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 307 & 312. 1951; Moldenke, Résumé 168 & 444. 1959; Moldenke, Phytologia 14: 255 (1967) and 15: 39. 1967.

Illustrations: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] pl. 3. 1932.

Merrill's original (1918) description of this species is: "Frutex ad 3 m. altus, subglaber, ramulis junioribus parciissime et decidue stellato-pubescentibus; foliis brevissime petiolatis, anguste lanceolatis, usque ad 12 cm. longis et 1.5 cm. latis, chartaceis, utrinque subaequaliter angustatis, acuminatis, basi cuneatis, margine in 3/4 superiore parte distincte serrulatis, supra glabris, subtus glandulosis, glabris, vel junioribus parciissime stellato-pubescentibus, nervis utrinque 7 ad 9, curvato-adscendentibus, tenuibus; cymis axillaribus depauperatis, 2- vel 3-floris, brevissime pedunculatis, pedicellis glabris, circiter 4 mm. longis; fructibus globosis, 3 ad 3.5 mm. diametro, glabris, calycis persistentibus, glabris, truncatis. A slender shrub, 2 to 3 m. high, in age glabrous or nearly so, the young branchlets sparingly stellate-pubescent. Branches slender, terete, smooth, glabrous, grayish. Leaves narrowly lanceolate, chartaceous, 6 to 12 cm. long, 0.8 to 1.5 cm. wide, narrowed at both ends, the upper surface glabrous, smooth, eglandular, brownish-olivaceous, shining, the lower surface slightly paler, distinctly pitted-glandular, glabrous, or when young sparingly stellate-pubescent near the midrib, the base cuneate, the apex rather slenderly but bluntly acuminate, the margins on the upper two-thirds distinctly serrulate; lateral nerves 7 to 9 on each side of the midrib, slender, curved-ascending, anastomosing, the reticulations slender, not prominent; petioles 2 mm. long or less. Cymes axillary, few, subsessile or shortly peduncled, depauperate, 2- or 3-flowered, the peduncles 2 mm. long or less, the pedicels not exceeding 4 mm. in length, glabrous. Fruit globose or subglobose, dark-brown when dry, 3 to 3.5 mm. in diameter, glabrous, the per-

sistent calyx truncate, glabrous."

The type of the species was collected by Elmer Drew Merrill (no. 11060) in thickets along small streams, at an altitude of about 900 meters, Loh Fau Mountain (Lofaushan), Kwangtung, China, on August 23, 1917, and was deposited in the herbarium of the Philippine Bureau of Science at Manila, now destroyed. The collector notes that the species is "rare, but a single plant seen. The alliance of this species is manifestly with the form commonly known as Callicarpa purpurea Juss., but which should be known as C. dichotoma (Lour.) Raeusch. It differs in its relatively much narrower leaves, and depauperate, subsessile, very few-flowered cymes."

Immature green fruit was collected in August. Bakhuizen van den Brink (1921) reduces the species to synonymy under what he calls C. japonica var. dichotoma (Lour.) Bakh. Chang (1951) cites only the original collection and compares it with both C. dichotoma (Lour.) K. Koch and with C. brevipes (Benth.) Hance.

The Tsang 21346, distributed as C. oligantha, is actually C. japonica var. angustata Rehd.

In all, 2 herbarium specimens, including the type, and 2 mounted photographs of C. oligantha have been examined by me.

Citations: CHINA: Kwangtung: E. D. Merrill 11060 (N--isotype, N--photo of type, Ph--type, Z--photo of type).

CALLICARPA OSHIMENSIS Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): 221. 1911.

Synonymy: Callicarpa oshimensis var. oshimensis Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959. Callicarpa ohshimensis Hayata ex Moldenke, Résumé Suppl. 16: 18, in syn. 1968.

Bibliography: Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 221. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 529. 1912; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; Sakaguchi, Gen. Ind. Fl. Okin. 18. 1924; S. Sasaki, Cat. Govt. Herb. Formosa 433. 1930; Mak. & Nemoto, Fl. Jap., ed. 2, 995. 1931; Nemoto, Fl. Jap. Suppl. 622. 1936; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 57 & 87. 1942; Hara, Enum. Sperm. Jap. 1: 185. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133 & 177. 1949; Naito, Sci. Rep. Kag. 2: 60. 1953; Moldenke, Phytologia 5: 28. 1954; Masamune, Sci. Rep. Kanazawa Univ. 4: [Enum. Tracheophyt. Ryukyu 7:] 46 & 47. 1955; Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959; Moldenke, Résumé 172, 181, & 444. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Hatus., Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3 (1): 31. 1962; Moldenke, Résumé Suppl. 3: 20 (1962), 5: 6 (1962), and 14: 4. 1966; Moldenke, Phytologia 14: 248--249. 1967; Moldenke, Résumé Suppl. 16: 11, 17, & 18 (1968) and 17: 8. 1968; Moldenke, Phytologia 21: 46, 240, & 242. 1971.

Previous to receiving good material of this taxon and of the so-called C. iriomotensis Masam. and C. okinawensis Nakai from my

esteemed friend and colleague, Dr. E. H. Walker, I had tentatively regarded them as 3 distinct and valid species. Now, however, I feel that Hatusima (1959) is amply justified in reducing them to a single species with two varieties. He says "Above three forms of C. oshimensis which are distinguished as the following analytical key are not different in their essential characters, such as size of cymes, flowers and fruits, and the indumentum of branchlets and leaves, though size of leaves and cymes as well as the serration of leaves are considerably variable. Therefore, it seems advisable to reduce the above two forms from Okinawa and Yaeyama to the varietal rank, as the distinguishing characters mentioned above are very variable as in the other species of Callicarpa." He distinguishes the 3 taxa as follows:

1. Leaf-blades regularly rhombic-ovate, 2--7 cm. long, acuminate at the apex, sharply and regularly coarse-serrate along the margins, cuneate at the base; cymes 1--3 cm. long.....
C. oshimensis.
- 1a. Leaf-blades rarely rhombic-ovate, often with shorter acumens and smaller, denser, and irregular serration.
2. Leaf-blades ovate to ovate-lanceolate, 2--4.5 cm. long, with smaller and denser serration; cymes usually less than 1 cm. long.....C. oshimensis var. okinawensis.
- 2a. Leaf-blades ovate to ovate-oblong or rarely obovate-oblong, 3--10 cm. long, with larger and coarser serration; cymes usually more than 1 cm. long.....
C. oshimensis var. iriomotensis.

Masamune (1955) records the vernacular name "osimamurasaki" for C. oshimensis and gives its distribution as "Amami-oshima (leg. Igoma) et (leg. Tasiro in G. Herb. Formos. n. 27877); Okinawa: Kunigami; Iheyazima; Iriomote?. Distr. Endemic." Hatusima (1959) gives the distribution of the typical form as only Amami-oshima and Tokunoshima Islands in the Ryukyu Archipelago.

Wilson found the plant fruiting in February. Material has been misidentified and distributed in herbaria as C. shikokiana Mak. On the other hand, the Gressitt 532 & 563, Itô s.n. [23. V. 1936], and Kawagoe s.n. [July 27, 1919], distributed as typical C. oshimensis, are actually var. iriomotensis (Masam.) Hatus.

In all, 3 herbarium specimens and 2 mounted photographs of the type collection of C. oshimensis have been examined by me.

Citations: JAPAN: Kyushu: E. H. Wilson 6050 (W--777757, W--777758). AMAMI ISLANDS: Amami-oshima: Kawagoe s.n. [July 17, 1919] (W--2071334); Uchiyama s.n. [December 8, 1900] (W--photo of type, W--photo of isotype).

CALLICARPA OSHIMENSIS var. IRIOMOTENSIS (Masam.) Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959.

Synonymy: Callicarpa iriomotensis Masam., Trans. Nat. Hist. Soc. Formos. 25: 254. 1935. Callicarpa oshimensis var. iriomo-

tensis Hatus. ex Moldenke, Résumé Suppl. 16: 18, in syn. 1968. Callicarpa ohshimensis var. iriomotensis (Masam.) Hatus. ex Moldenke, Résumé Suppl. 16: 18, in syn. 1968. Callicarpa ohshimensis var. iriomotensis (Masam.) Masam. ex Moldenke, Résumé Suppl. 16: 18, in syn. 1968.

Bibliography: Masam., Trans. Nat. Hist. Soc. Formos. 25: 254. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Sonohara, Tawada, & Amano, ed. E. H. Walker, Fl. Okin. 131. 1952; Masam., Sci. Rep. Kanazawa Univ. 4 [Enum. Tracheophyt. Ryukyu 7]: 46. 1955; Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959; Moldenke, Résumé 181 & 444. 1959; Moldenke, Phytologia 14: 248--249. 1967; Moldenke, Résumé Suppl. 16: 11, 12, 17, & 18. 1968; Moldenke, Phytologia 21: 242. 1971.

For a statement on how this variety differs from the typical form of the species, see under C. oshimensis in this series of notes. Recent collectors describe the plant as a bush or shrub, 1.8--6 m. tall, the stems 1.5--2 cm. in diameter, the branches spreading horizontally, and the (immature) fruit green or pale-green and moderately small. The corollas are described as "pink" on Hatusima 18600.

The variety has been collected in the shade of large trees, in forests, at the edges of fringing forests, and in wet gulch bottoms in dense low scrubby forests, at altitudes of 12--200 m., flowering in May and June, and fruiting in June, August, and November. Fosberg says that it is "occasional in undergrowth on broad or high densely wooded ridges", while Hatusima refers to it as a "common shrub" on Iriomote. Masamune (1955) says that it is endemic to Isjigaki, Iriomote, and Yonaguni in the Sakashima group of the Ryukyu Island Archipelago and records the vernacular name "Iriomote-murasaki-sikibu". Hatusima (1959) lists it only from Iriomote and Ishigaki.

Material of this taxon has been misidentified and distributed in herbaria under the names C. japonica Thunb., C. okinawensis Nakai, and C. oshimensis Hayata. On the other hand, the Hatusima 18577 & 24357, distributed as var. iriomotensis, are actually var. okinawensis (Nakai) Hatus.

In all, 18 herbarium specimens of var. iriomotensis have been examined by me.

Citations: RYUKYU ISLAND ARCHIPELAGO: Iriomote: Gressitt 532 (N, S), 563 (N); Hatusima 18600 (W--2243550); Kawagoe s.n. [July 27, 1919] (W--2071333, Z); Koidzumi s.n. [1--20.VII.1923] (W--2070985); Masamune & Suzuki s.n. [June 28, 1935] (Tw); Tedodake s.n. [Herb. Univ. Imp. Taihok. 3307] (Tw); Walker & Tawada 6654 (N, W--2093919). Ishigaki: F. R. Fosberg 37191 (Z), 38008 (Rf), 38054 (Ac); Hatusima 22899 (Ar), 23006 (Ar); Masamune & Suzuki s.n. [June 30, 1935] (Tw). Uchibanare: Itô s.n. [23.V.1936] (Tk).

CALLICARPA OSHIMENSIS var. OKINAWENSIS (Nakai) Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959.

Synonymy: Callicarpa okinawensis Nakai, Bot. Mag. Tokyo 36: 22. 1922. Callicarpa mollis Matsum. ex Nakai, Bot. Mag. Tokyo 36: 22, in syn. 1922 [not C. mollis Koord., 1966, nor Req., 1839, nor Shirasawa, 1949, nor Sieb. & Zucc., 1844, nor Willd., 1840]. Callicarpa mollis (non Sieb. & Zucc.) Matsum., Sci. Rep. Kanazawa Univ. 4 [Enum. Tracheophyt. Ryukyu 7]: 46, in syn. 1955. Callicarpa okinawaensis Nakai apud Masam., Sci. Rep. Kanazawa Univ. 4 [Enum. Tracheophyt. Ryukyu 7]: 46. 1955. Callicarpa ohshimensis var. okinawensis (Nakai) Hatus. ex Moldenke, Résumé Suppl. 16: 18, in syn. 1968.

Bibliography: J. Matsum., Bot. Mag. Tokyo 13: 114. 1899; Kuroiwa, Bot. Mag. Tokyo 14: 126. 1900; J. Matsum., Ind. Pl. Jap. 2 (2): 529. 1912; E. H. Wils., Journ. Arnold Arb. 1: 183. 1920; Nakai, Bot. Mag. Tokyo 36: 22--23. 1922; Sakaguchi, Gen. Ind. Fl. Okin. 18. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 37. 1929; Mak. & Nemoto, Fl. Jap., ed. 2, 995. 1931; Nemoto, Fl. Jap. Suppl. 622. 1936; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 61 & 87. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 140 & 177. 1949; Sonohara, Tawada, & Amano, ed. E. H. Walker, Fl. Okin. 131. 1952; Naito, Sci. Rep. Kag. 2: 60. 1953; Masam., Sci. Rep. Kanazawa Univ. 4 [Enum. Tracheophyt. Ryukyu 7]: 46--47. 1955; Hatus., Bull. Arts & Sci. Div. Ryukyu Univ. (Math. & Nat. Sci.) 3: 107. 1959; Moldenke, Résumé 181, 245, & 444. 1959; Moldenke, Résumé Suppl. 4: 8 & 11 (1962) and 5: 6. 1962; Moldenke, Phytologia 13: 431 & 433 (1966) and 14: 142. 1966; Moldenke, Résumé Suppl. 16: 11, 12, & 18 (1968) and 17: 8. 1968; Moldenke, Phytologia 21: 240 & 242. 1971.

The characters by which this variety is distinguished from C. oshimensis Hayata and C. oshimensis var. iriomotensis (Masam.) Hatus. are enumerated in my discussion of C. oshimensis in this present series of notes. Nakai (1928), Masamune (1955), and Hatusima (1959) all agree that the variety is endemic to Okinawa. Masamune records the vernacular name "kogomemurasaki" and cites Masamune & Simabukuro s.n. [Yonawadake, Aug. 6, 1934]. He says that the "C. mollis Sieb. & Zucc." of Matsumura (1899), Kuroiwa (1900), E. H. Wilson (1920), Matsumura (1912), and Sakaguchi (1924), insofar as they refer to Ryukyu Islands specimens, is actually C. oshimensis var. okinawensis. The C. mollis accredited to Koorders and referred to in the synonymy above, is actually a synonym of C. caudata Maxim., that credited to Shirasawa is C. shirasawana Mak., and that of Requier and of Willdenow is C. acuminata H.B.K., while that of Siebold & Zuccarini is a valid species.

Recent collectors describe this plant as a shrub, 2 m. tall, growing in the shade of trees, along forest paths, in small clearings, and at the edges of low spinnies, at 100--200 m. altitude, flowering in May, and fruiting in July. On Yonakuni Island

it is said by Hatusima to be "frequent in mountain thickets", but on Iriomote he reports it as "a rare shrub". The corollas are described as "pink" on Hatusima 18041.

Material of this variety has been misidentified and distributed in herbaria under the names C. oshimensis Hayata, C. oshimensis var. iriomotensis (Masam.) Hatus., and C. ohshimensis var. iriomotensis (Masam.) Hatus. On the other hand, the Koidzumi s. n. [1-20.VII.1923], distributed as var. okinawensis, is actually a mixture with var. iriomotensis.

In all, 16 herbarium specimens and 1 mounted photograph of var. okinawensis have been examined by me.

Citations: RYUKYU ISLAND ARCHIPELAGO: Iriomote: Hatusima 18577 (Tk, W-2243547); Koidzumi s. n. [1-20.VII.1923] (Mi, Z). Okinawa: Hatusima 18041 (W-2243407); Koidzumi s. n. [27.V-3.VI.1923] (W-2070986), s. n. [1-20.VII.1923] (W-2070985, Z); Masamune & Simabukuro 1770 (Tw); J. Matsumura s. n. (Tk); Sonohara, Tawada, & Amano 6332 (N, N, W-2093654); Tashiro 2 (W-photo); E. H. Walker 8254 (Z); Yamazaki s. n. [Jan. 9, 1964] (Tk). Yonakuni: Hatusima 24357 (Ar).

CALLICARPA PACHYCLADA Quisumb. & Merr., Philip. Journ. Sci. Bot. 37: 195-196. 1928.

Synonymy: Callicarpa pachyclada Merr. & Quisumb. ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Bibliography: Quisumb. & Merr., Philip. Journ. Sci. Bot. 37: 195-196. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 177. 1949; Moldenke, Phytologia 5: 28 & 29. 1954; Moldenke, Résumé 183, 194, & 444. 1959; Moldenke, Résumé Suppl. 3: 30. 1962; Moldenke, Phytologia 21: 229. 1971.

The original description of this species (1928) reads as follows in the English version: "A shrub about 3 m high; the thickened branchlets and the lower surface of the leaves densely fulvotomentose with rather soft plumose and stellate hairs; branches terete or somewhat compressed at the nodes, pale grayish. Leaves chartaceous to subcoriaceous, broadly oblong-elliptic, 27 to 39 cm long, 14 to 21 cm wide, undulate-dentate, apex acutely acuminate, base acute, the upper surface olivaceous, glabrous, smooth, shining, the lower surface pale, somewhat yellowish, not at all glandular, very densely stellate-plumose-pubescent; lateral nerves about 10 on each side of the midrib, very prominent, the reticulations distinct; petioles densely tomentose, somewhat angled, 4 to 6 cm long. Cymes axillary, many-flowered, dichotomous, very densely tomentose, pedunculate, 6 to 8 cm long, 5 to 10 cm wide. Flowers crowded, their pedicels 0.5 to 1 mm long; calyx membranaceous, cup-shaped, shortly 4-lobed, tomentose, about 1.75 mm long; corolla 4-lobed, 3 to 3.5 mm long, 2.5 to 3 mm in diameter, the lobes 1.25 to 1.5 mm long, about 1 mm wide, oblong-ovate, obtuse. Stamens 4, exserted, the filaments 4 to 4.5 mm long; anthers ob-

long, 1.25 to 1.4 mm long. Fruit globose, glabrous, 2 to 2.5 mm in diameter, surrounded at the base by the densely fulvo-tomentose calyx; bracts densely fulvo-tomentose, linear, up to 15 mm long, the bracteoles much shorter."

The type of the species was collected by Maximo Ramos and Gregorio E. Edaño [Herb. Philip. Bur. Sci. 45640] on forested slopes at an altitude of about 1600 meters on Mount Alzapan, in Nueva Vizcaya Province, Luzon, Philippine Islands, on May 24, 1925, and was deposited in the herbarium of the Philippine Bureau of Science but is now destroyed.

Quisumbing & Merrill comment that this is "A species most closely allied to Callicarpa magnifolia Merrill, but with broadly oblong-elliptic, somewhat larger leaves, the margins undulate-dentate and the base acute."

Recent collectors describe the plant as 3 m. tall, the stems 10 cm. in diameter, the (immature) fruit green, flowering and fruiting in May, growing in mossy forests at an altitude of 1600 meters. The corollas on the type collection are described as "violet", but those on Kjellberg 1763 are said to have been white.

Material of this species has been misidentified and distributed in herbaria under the names C. pentandra var. cumingiana f. pentamera (H. J. Lam) Bakh., C. pentandra f. pubescens Bakh., and C. pentandra var. typica f. hexandra Bakh.

In all, 9 herbarium specimens, including the type collection, and 2 mounted photographs of C. pachyclada have been examined by me.

Citations: PHILIPPINE ISLANDS: Luzon: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45640] (B--isotype, Bz--18104--isotype, Ca--329895--isotype, N--isotype, N--photo of isotype, Z--photo of isotype). GREATER SUNDA ISLANDS: Celebes: Barhi 76 [Boschproefst. bb.24101] (Bz--18568); Kjellberg 1763 (Bz--18233, Z); Rachmat 640 (Bz--18564, Bz--18565).

CALLICARPA PARVIFOLIA Hook. & Arn., Bot. Beech. Voy. 305. 1838.

Synonymy: Callicarpa nishimurae Koidz., Bot. Mag. Tokyo 32: 136--137. 1918.

Bibliography: Hook. & Arn., Bot. Beech. Voy. 305. 1838; Walp., Repert. Bot. Syst. 4: 129. 1845; Schau. in A. DC., Prodr. 11: 646. 1847; W. B. Hemsl. in Godman & Salvin, Biol. Cent.-Am. Bot. 2: 538. 1882; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Koidz., Bot. Mag. Tokyo 32: 136--137. 1918; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1253. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Hosokawa, Journ. Soc. Trop. Agr. Taiwan 6: 205. 1934; Moldenke in Fedde, Repert. Spec. Nov. 39: 300 (1936) and 40: 46--48, 120, & 121. 1936; Moldenke, Geogr. Distrib. Avicenn. 13. 1939; Moldenke, Geogr. Distrib. Verbenac., [ed. 1], 16, 61, & 87. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Alph. List Cit. 1: 36. 1946; Hara, Enum. Sperm. Jap. 1: 185. 1948; H. N. & A. L. Moldenke, Pl. Life

2: 74. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 28, 140, & 177. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 294. 1951; Moldenke, Résumé 34, 182, & 444. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Moldenke, Phytologia 21: 152. 1971.

Hooker & Arnott's original (1838) description of this species is "foliis coriaceis obovatis obtusissimis breve petiolatis laeviter crenatis supra adultis glabris subtus dense cano-tomentosis reticulatim venosis, pedunculis petiolum aequantibus, floribus capitato-cymosis. Leaves an inch and a half long; the younger ones inclining to rust-colour beneath. The peduncles and petioles are densely stellate-tomentose, like the under side of the foliage."

Standley (1924) keys out the species of Callicarpa known to him from Mexico as follows:

1. Leaf-blades obovate, very obtuse at the apex....C. parvifolia.
- 1a. Leaf-blades lanceolate to ovate, acute or acuminate at the apex.
 2. Leaves persistently but minutely stellate-pubescent on the upper surface.....C. acuminata.
 - 2a. Leaves glabrous on the upper surface except when very young.
 3. Leaves densely stellate-tomentose beneath.....C. pringlei.
 - 3a. Leaves sparsely stellate-tomentose beneath.....C. subpubescens.

It should be noted, however, that C. subpubescens Hook. & Arn. has since Standley's work been proved not to grow at all in Mexico, but to be endemic to the Bonin Islands instead. Now it appears that C. parvifolia does not occur in Mexico either. Dr. S. Hatusima, in a letter to me dated January 18, 1971, states "I am now studying the real status of Callicarpa parvifolia Hook. & Arn. described as from Mexico and [am] inclined to believe from the original description of this species and the following answer from Dr. R. M. Harley of the Royal Botanic Garden, Kew, to whom I sent a leaf of C. nishimurae Koidz. from the Bonins for comparison with the type of C. parvifolia Hook. et Arn. that C. parvifolia Hook. et Arn. is not from Mexico but from the Bonins. 'I have now examined the leaf of Callicarpa nishimurae Koidz. with those of the type of C. parvifolia Hook. et Arn. The similarity between the two is very striking, and the texture of the indumentum on the leaf undersurface appears identical, when viewed under a dissecting microscope. There thus seems little doubt that, as you suggest, the type was collected in the Bonins, and not in Mexico. In our indetermined cover, we had a sterile specimen of C. parvifolia collected in the 1930s from the Bonins, and this also agreed closely with the type....'"

The original description of C. nishimurae by Koidzumi (1918) is as follows: "Ad C. paucinervia Merrill remote affinis, foliis crassioribus coriaceis ellipticis utrinque rotundatis supra pilis diutius persistentibus subtus indumento luteo-brunneo; calycis dentibus longis acutisque differt. Arbuscula? ramis vetustiori-

bus atro-brunneis vel nigrescentibus, ramulis hornotinis inflorescentiis foliis subtusque indumento sordido vel lutescente densissime stellato-pubescentibus. Folia late elliptica crasse coriacea supra in siccitate nigra albo-stellato-pilosa et glandulosa utrinque rotundata, margine crenato-denticulata versus basin integra, costis secundariis utrinque 4--5 supra planis subtus leviter elevatis, lamina 2--5 cm. longa, 1.3--3.0 cm. lata; petiolis carnosius ad 8 mm. longis tomentosis. Cyma axillaris parva tomentosa, floribus brevissime pedicellatis. Calyx glaber acute 4-denticulatus glandulosus circ. 1.8 mm. altus. Nom. Jap. Urajiro-komurasaki. Distr. Bonini insl. Chichishima (leg. S. Nishimura no. 72, Aug. 15, 1917. This species is named in compliment to Mr. S. Nishimura who collected the plant."

Hara (1948) cites as an illustration of this species a "f. 2488 (1938)", but unfortunately gives the name of the publication and its author only in Japanese characters.

It appears, thus, that all previous writers, including myself, have been in error in ascribing C. parvifolia to Mexico. The original inscription to this effect on the type sheet at Kew was apparently an error in transcription, as it was in the case of C. subpubescens. Since Standley did his work on the trees and shrubs of Mexico, then, Mexico has "lost" two species of beautyberry, but it has also gained one he did not know about -- C. americana L., which occurs in Coahuila.

In all, 3 herbarium specimens, including the type, and 2 mounted photographs of C. parvifolia have been examined by me.

Additional & emended citations: BONIN ISLANDS: Chichijima: Beechey s.n. ["Tepic"] (K--type, K--isotype, Mi--photo of type, N--isotype, Z--photo of type).

CALLICARPA PAUCIFLORA Chun ex H.-T. Chang, Act. Phytotax. Sin. 1: 275. 1951.

Synonymy: Callicarpa pauciflora "Chun ex Chang" apud Chang, Act. Phytotax. Sin. 1: 309. 1951.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: [269], 274, 275, 309, & 311. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 11: 3. 1966.

The original description of this species by Chang (1951) is as follows: "Frutex circ. 60 cm altus. Ramuli teretes plus minusve lenticellati, hornotini stellato-pubescentes, annotini glabri pallidi. Folia ovato-elliptica vel elliptica 6--10 cm longa, 2.5--4 cm lata, apice acuminata vel breviter acuminata, basi late acuta, quadrante inferiore et apice excepto crenato-serrata, supra viridia sparse stellato-puberula, subtus pallidiora stellato-pubescentia, nervis utrinsecus 7--9, supra conspicuis subtus elevatis; petioli 4--6 mm longi, stellato-pubescentes. Cymae parvae, pauciflorae (floribus circ. 3--7), bis dichotomae, 1 cm latae, stellato-pubescentes, pedunculis 4--6 mm longis, pedicellis 1--1.5 mm longis; bractee lineari-lanceolatae 8 mm longae, 1 mm latae; bracteolae subulatae 1.5 mm longae; calyx ad medium lobatus 2.2 mm longus stellato-pubescent, lobis acutis lanceolatis

circ. 1 mm longis; corolla rosea 3.5 mm longa parcissime puberula, lobis ovatis; stamina exserta, filamentis 4--5 mm longis, antheris 1 mm longis longitudinaliter dehiscentibus; ovarium sparse pubescens, stylo circ. 6 mm longo. Fructus ignotus."

The type and apparently only known collection of this taxon is S. P. Ko 52908, collected in 1903 in Canton, Kwangtung, China, and deposited in the herbarium of the Botanical Institute of Sun-yatsen University in Canton. Chang (1951) compares it with C. longipes Dunn.

CALLICARPA PEDUNCULATA R. Br., Prodr. Fl. Nov. Holl. 1: 513. 1810.

Synonymy: Callicarpa cuspidata Roxb., Hort. Beng. [83], hyponym. 1814; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409. 1820 [not C. cuspidata Bakh., 1932, nor Hassk., 1921, nor Lam & Bakh., 1951]. Callicarpus dentata Roth ex Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 98. 1818. Callicarpa dentata Roth, Nov. Pl. Sp. 81--82. 1821 [not C. dentata Pav., 1936, nor Roxb., 1831, nor Sessé & Moc., 1940]. Callicarpa lanata Zipp. ex Span., Linnaea 15: 330. 1841 [not C. lanata Gamble, 1893, nor Hosséus, 1912, nor L., 1771, nor H. J. Lam, 1940, nor Lam., 1821]. Callicarpus cuspidata Roxb. ex Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844. Callicarpus oblongifolia & acuminatissima Hassk., Cat. Pl. Bot. Bogor. Cult. Alt. 136. 1844. Callicarpa lanata Vahl ex Schau. in A. DC., Prodr. 11: 644. 1847. Callicarpa oblongifolia var. acuminatissima Hassk. apud Miq., Fl. Ind. Bat. [Fl. Ned. Ind.] 2: 887, in syn. 1856. Callicarpa cana Wall. (in part) apud Bocq., Adansonia 3: 192. 1863 [not C. cana Dalz. & Gibs., 1919, nor Gamble, 1889, nor L., 1771, nor Spreng., 1866, nor Vahl, 1866]. Callicarpa lanata Schau. apud Benth. & F. Muell., Fl. Austral. 5: 57, in syn. 1870. Callicarpa tiliaefolia Tiejsm. & Binn. ex C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 569, in syn. 1885. Callicarpa pedunculata var. typica H. J. Lam, Verbenac. Mal. Arch. 56--57. 1919. Callicarpa lanata Walp. apud Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 24, in syn. 1921. Callicarpa pedunculata R. Br. ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 24, sphalm. 1921. Callicarpa pedunculata Roth ex Schwenke, Zytol. Untersuch. Verbenac. 27 & 28. 1931. Callicarpus cuspidata Hassk. ex Moldenke, Prelim. Alph. List Invalid Names 13, in syn. 1940. Callicarpus oblongifolia var. acuminatissima Hassk. ex Moldenke, Prelim. Alph. List Invalid Names 14, in syn. 1940.

Bibliography: Rumph., Herb. Amb. 4: 124, pl. 59. 1743; Vahl, Symb. Bot. 3: 13. 1794; R. Br., Prodr. Fl. Nov. Holl. 1: 513. 1810; Poir. in Lam., Encycl. Méth. Suppl. 2: 34. 1811; Roxb., Hort. Beng. [83]. 1814; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 3: 98. 1818; Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 394, 409, & 481. 1820; Roth, Nov. Pl. Sp. 81--83. 1821; Steud., Nom. Bot., ed. 1, 137. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825;

Blume, Bijdr. Fl. Nederl. Ind. 14: 818. 1826; J. A. & J. H. Schultes., Mant. 3: 52—55. 1827; Spreng. in L., Syst. Veg., ed. 16, 5: 126. 1828; Wall., Numer. List "49" [=50]. 1828; Roxb., Fl. Ind., ed. 2 [Carey], 1: 394 & 395. 1832; D. Dietr., Syn. Fl. 1: 428—429. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Span., Linnaea 15: 330. 1841; Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844; Walp., Repert. Bot. Syst. 4: 128. 1845; Schau. in A. DC., Prodr. 11: 644. 1847; Hassk., Pl. Jav. Rar. 491. 1848; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur.] 3: 503. 1851; Benth. in Hook., Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; Miq., Fl. Ind. Bat. [Fl. Ned. Ind.] 2: 886—887. 1856; Miq., Fl. Ind. Bat. [Fl. Ned. Ind.] Suppl. 1: 243. 1860; Regel, Gartenfl. 9: 56. 1860; Sieb. & de Vriese, Ann. Hort. Bot. Pays-Bas [Fl. Jard.] 4: 97. 1861; Rosenthal, Syn. Pl. Diaphor. 430. 1862; Regel, Gartenfl. 12: 101. 1863; Bocq., Adansonia 3: 192. 1863; E. Pritz., Icon. Bot. Ind. 2: 55. 1866; F. Muell. in Landsb., Explor. Austr. 119. 1866; Benth. & F. Muell., Fl. Austral. 5: 57. 1870; Roxb., Fl. Ind., ed. 3 [C. B. Clarke], 132. 1875; F. Vill., Nov. App. 158. 1880; F. Muell., First Census 103. 1882; F. M. Bailey, Syn. Queensl. Fl. 377. 1883; F. M. Bailey, Proc. Roy. Soc. Queensl. 1: 70. 1884; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 569. 1885; W. B. Hemsl. in Thomson & Murray, Rep. Scient. Res. Voy. Challenger 3, Bot. 1: 110. 1885; Forbes, Wander. Naturf. Mal. Arch. 2: 226. 1886; F. Muell., Second Census 173. 1889; K. Schum. & Hollr., Fl. Kaiser Wilk.-land 119. 1889; F. M. Bailey, Cat. Pl. Queensl. 35. 1890; N. E. Br. in Johnson, Gard. Dict. 157. 1890; Warb. in Engl., Bot. Jahrb. 13: 426. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Moore & Betche, Handb. Fl. N. S. Wales 356. 1893; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 522. 1900; Britten in Banks & Soland., Illustr. Austral. Pl. [Bot. Cook's Voy. 2:] 74, pl. 237. 1901; F. M. Bailey, Queensl. Fl. 4: 1174. 1901; W. P. Wright in Cassell, Dict. Pract. Gard., ed. 1, 1: 156. 1902; F. M. Bailey in Meston, Exp. Bell.-Ker (Parliam. Rep.) 14. 1904; Rehd. in L. H. Bailey & Mill., Cycl. Am. Hort. 1: 217. 1906; W. P. Wright in Cassell, Dict. Pract. Gard., ed. 2, 1: 156. 1907; King & Gamble, Journ. Roy. Asiat. Soc. Bengal 74 (2), extra no., 803 & 807—808. 1908; King & Gamble, Mat. Fl. Malay. Penins. 21: 1013 & 1017—1018. 1909; Koord., Exkursionsfl. Java 3: 134. 1912; F. M. Bailey, Compreh. Cat. Queensl. Pl. 382. 1913; Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 629. 1914; H. J. Lam in H. Hallier, Meded. Rijks Herb. Leid. 37: 33—34. 1914; E. D. Merr., Interpret. Rumph. Herb. Amboin. 448—449, 526, & 559. 1917; H. J. Lam, Verbenac. Malay. Arch. 46, 54—58, & 65. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 11 & 23—27. 1921; H. N. Ridl., Fl. Malay Penins. 2: 617. 1923; E. D. Merr., Enum. Philip. Flow. Pl. 3: 388. 1923; H. J. Lam in Engl., Bot. Jahrb. 59: 88. 1924; Heyne, Nutt. Plant. Nederl. Ind., ed. 1, 1311. 1927; Domin, Bibl. Bot. 22 [89 (6)]: 1108. 1928; Stapf, Ind. Lond. 1: 525 & 526. 1929; Schwenke, Zytol. Untersuch. Verbenac. 27 & 28. 1931; Metc., Lign. Sci. Journ. 11: 405—408. 1932; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 505 & 506. 1932.

[to be continued]

FOUR NEW SPECIES OF MOSSES FROM PERU

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A number of undescribed species have been found in various small collections of Peruvian bryophytes sent for determination by A. Sagastegui and F. Ayala of Trujillo, and Dana Griffin III of Florida. Three of these species are described here and a fourth is described from misdetermined material obtained on loan from New York. These species all reflect the need for further work with the bryophytes of Peru. I have come to believe that Peru has more undescribed species and more unrecognized range extensions at this time than any other country in South America. I have already added two new species to the flora in recent years (Robinson, 1967), and one species has been described by Crum (1967). The new species are from various parts of Peru, but a number, including Barbula malagana Crum, are from the coastal region which I intend to discuss more fully in another paper. It is sufficient to point out here that this coastal area and the "lomas" found there seem to have an unusually high percentage of endemic bryophyte species.

Trichostomum marginatum H. Robinson, sp. nov. (Fig. 1-4).

Planta dioica?, dense caespitosa pallide viridis, inferne sordida. Caulis ca. 1 cm longi simplices vel parce ramosi. Folia caulina erecta laxa disposita, siccitate superne valde circinata, linearia ca. 3 mm longa, in apicibus cylindricis attenuata, margine integra vel minute subcrenulata erecta bi- tristratosa; nervis prope basin 80μ latis, ad extremum subulatis indistincte; cellulis basilaribus angustis elongatis $8-10\mu$ latis ad 70μ longis laevibus pellucidis, mediis et superioribus quadratis vel transverse elongatis 13μ longis $7-13\mu$ longis minute multi-papillosis. Folia perichaetialia arcte convoluta. Calyptrae cucullatae. Setae erectae ca. 2 cm longae rufescentes. Capsulae erectae anguste ovaes inoperculatae 1.5 mm longae laevissimae rufescentes; operculis longe conicis 0.7-1.0 mm longis; dentibus pallidis uniseriatis filiformibus erectis dense papillosis ad 300μ longis. Sporae ovaes $10-12\mu$ diam. asperulae.

Peru. Dept. Huanuco: Muña, on shaded bank about 7000 ft., George S. Bryan 507a (NY, holotype).

The species is distinguished from others of the genus Trichostomum by the thickened margin. The margins of the leaves are actually erect to incurved but might seem slightly recurved because of the thickening. For this reason the species might be

compared with Trichostomopsis (Robinson, 1970) which, however, has only one stereid band in the costa. The type specimen of Trichostomum marginatum was originally determined as a member of the genus Barbula subgenus Asteriscium (= Trichostomopsis).

Tortula acletoi H. Robinson, sp. nov. (Fig. 5-7).

Planta dioica?, laxe caespitosa pallide viridis. Caules 2-5 mm longi simplices vel parce ramosi. Folia caulina erecto-patentia, siccitate valde contorta, oblonga 2.0-3.5 mm longa ad 1.0 mm lata late acuta saepe breve apiculata, margine argute serrulata erecta unistratosa; nervis prope basin ca. 80 μ latis percurrentis; cellulis basilaribus elongatis ca. 25 μ latis 50-100 μ longis laevis pellucidis, margine 5-6 seriebus angustissimis; cellulis mediis et superioribus quadratis vel sexangulatis 15-20 μ diam. multipapillois; cellulis marginalibus fere usque ad apicem in 1-2 seriebus linearibus 5-10 μ latis 50-100 μ longis. Folia perichaetia vix differentia aliquantum convoluta. Calyptrae cucullatae. Setae erectae 10-12 mm longae flavae vel rufescentes. Capsulae erectae cylindricae, 3.0-3.5 mm longae sine operculis, laeves rufescentes; operculis longe conicis ca. 1.5 mm longis; dentibus filiformibus spiralibus ad 1.5 mm longis, inferne coalitis. Sporae ovales 8-10 μ diam.

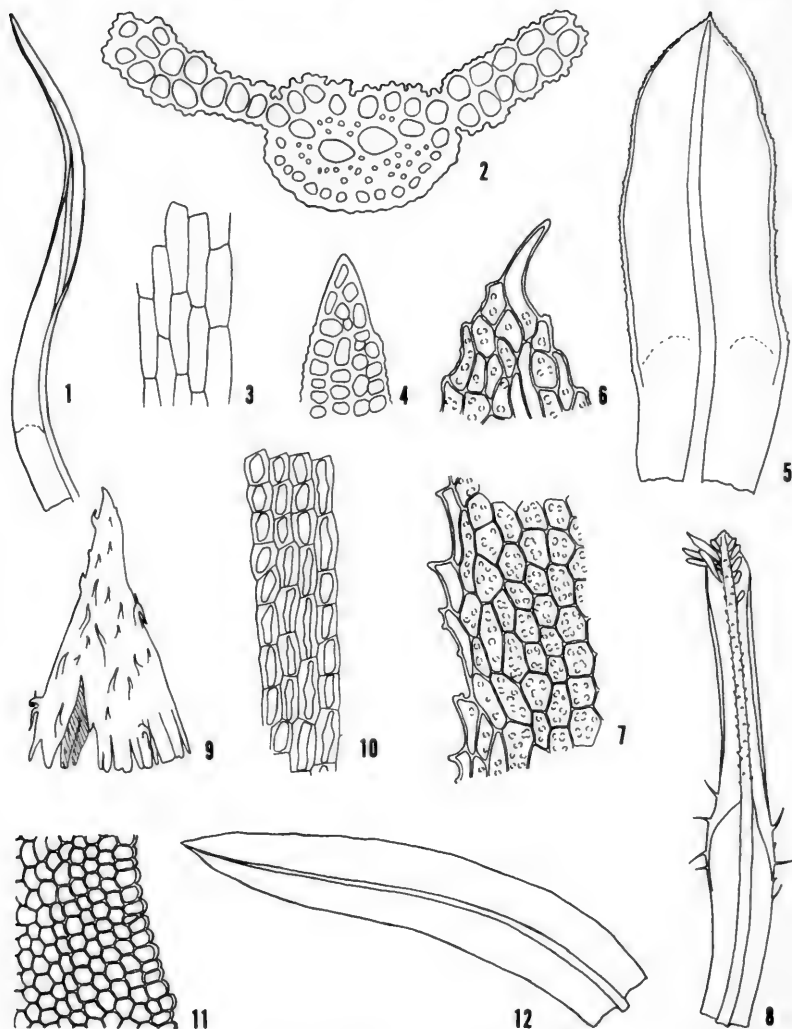
Peru. Dept. Lima: Prov. Canta, Huascay, alt. 2800 m, Borde de terreno de cultivo, Cesar Acleto 1468 (US, holotype).

The new species seems very close to Tortula denticulata (Wils.) Mitt., but the latter is distinct by the lack of papillae on the leaf cells and by minor differences in the serrulation. Few other species in the genus have a serrulate margin with elongate cells.

Syrhophodon griffinii H. Robinson, sp. nov. (Fig. 8).

Planta dioica parva luteo-viridis dense caespitosa arenicola. Caules ca. 0.5 cm alti subsimplices. Folia 2.0-2.7 mm longa ad 0.35 mm lata, siccitate erecto-patentia vel aliquantum contorta, madida erecto-patentia, lingulata breve acuta; basi vix latiora, fere ad apicem per cellulas elongatas limbata, superne serrata, medio utrinque 5-8 ciliata; ciliis singulis vel raro binis; nervis subpercurrentibus utrinque spinoso-papillois, apice saepe propaguliferis; cellulis mediis et superioribus subquadratis 6-8 μ latis 6-10 (raro 12) μ longis, humiliter bi- vel multifido-papillois; apicibus cancellinarum plerumque acutis, cellulis cancellinarum ad 25 μ latis et 60 μ longis. Cetera ignota.

Peru. Dept. Loreto: cerca de Zungara Cocha a 25 kms. al oeste de Iquitos, ocurriendo en suelo arenoso, Dana Griffin III and Nancy Griffin, 14 July 1965 (US, holotype; LAF, isotype).



Figs. 1-12. Peruvian mosses. 1-4. Trichostomum marginatum. 1. Leaf, $\times 25$. 2. Leaf cross-section, $\times 375$. 3. Basal leaf cells, $\times 250$. 4. Leaf tip, $\times 250$. 5-7. Tortula acletoi. 5. Leaf, $\times 25$. 6. Leaf tip, $\times 250$. 7. Cells of leaf margin, $\times 250$. 8. Syrrhodon griffinii, leaf, $\times 25$. 9-12. Macromitrium lomasense. 9. Calyptra, $\times 12$. 10. Basal leaf cells, $\times 250$. 11. Cells of upper leaf margin, $\times 250$. 12. Leaf, $\times 20$.

The new species is very close to the recently described Syrrhopodon brevisetus Florsch. of Suriname. Most characters such as the occasional paired marginal cilia, cancellinae acute above, and both surfaces of the costa strongly spinose-papillose, are found in both species. Still, there is a distinct difference in the upper leaf cells which are subquadrate and $6-8\mu$ in diameter in S. griffinii versus elongate and $18 \times 10\mu$ in S. brevisetus.

Macromitrium lomasense H. Robinson, sp. nov. (Fig. 9-12).

Planta dioica mediocris terricola et epiphytica laxae lateque caespitosa fuscoviridis. Caules prostrati dense ramosi; ramis erectis ad 1 cm longis. Folia sat densa, siccitate adpressa, aliquantum hamata, valde carinata, in spira curvata, madida patula, anguste oblonga vel linearia 2.0-3.0 mm longa 0.5-0.6 mm lata breviter acuta vel breve apiculata, margine integra vel minute crenulata; nervis laevibus percurrentibus, inferne ca. 40μ latis; cellulis basilaribus ca. 8μ latis 15-30 μ longis interdum unipapillosis in superficie adaxiali; parietibus longitudinalibus sat incrassatis, cellulis marginalibus inferne in seriebus unicis laxis, mediis et superioribus rotundatis mamillosis 6-12 μ diam. non papillosis. Folia perichaetalia vix differentia vel breviora. Calyptrae mitratae ca. 15-lobatae sparse hirsutae. Setae erectae ca. 5 mm longae laeves stramineae vel inferne rufescentes. Capsulae erectae subglobosae infuscae 2 mm longae sine operculis laeves vel obscure costatae; operculis recte aciculari-rostratis; dentibus exterioribus et interioribus inter se subconcretis obtusis luride flavidis dense papillosis. Sporae sphaericae dense papillosae 25-30 μ diam.

Peru. Dept. La Libertad: Prov. Trujillo, Cerro Chiputur, 650 m, saxicola, F. Ayala 7124 c. fr. (US, holotype; HUT, isotype).

Additional collections:

Dept. La Libertad: Prov. Trujillo, Cerro Chiputur, on rock and soil, F. Ayala 7061 c. fr., 7063a, 7064; alt. 780 m, Ayala 7114; Lomas de Virú, on trees and rocks, alt. 540-720 m, Ayala 7007, 7010, 7011, 7012, 7012, 7016, 7017, 7018, 7020, 7021, 7023, 7034, 7078, 7079, 7080.

Dept. Lima: Prov. Chancay, Lachay, km 88 carretera al norte, alt. 520 m, in Lomas, Emma Cerrate 882 c. fr.; alt. 440 m, Lomas pedregosas, Cerrate 884 c. fr.

The new species resembles some of the common members of Macromitrium, but it is rather distinct in the slightly more robust habit and the slightly but distinctly hairy calyptra. The basal leaf cells never seem to have as many papillae though this character is variable in some related species. The habit and most of the described features of M. lomasense are like the common M. punctatum (Hook. & Grev.) Brid., but the latter has

longer basal leaf cells. A number of species such as M. atroviride Williams, M. cylindricum Mitt. and M. sublaeve Mitt. seem similar to M. lomasense on the basis of descriptions, but they are smaller plants with either more glabrous or more prominently hairy calyptrae.

The species is apparently widely distributed in the Lomas along the coast of Peru.

Literature Cited

- Crum, H. 1967. Barbula malagana, a new species from Peru. Bryologist 70: 235-237.
- Robinson, H. 1967. Six new bryophytes from South America. Bryologist 70: 317-321.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XXXVIII.

A NEW GENUS, PETERAVENIA.

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Five Eupatorian species from Mexico and Central America represent a distinctive previously unnamed genus having deciduous pappus setae, discolored phyllaries, and cordate leaves. The pappus setae alone are sufficient to distinguish the genus, being very narrow at the base and noncontiguous but enlarged at the tip. The genus is Critonioid in its smooth corolla lobes and its usually simple style base. One feature that is more reminiscent of Ageratina, however, is the usually high placement of the embryo in the achene.

We take great pleasure in naming this new genus in honor of our good friend and colleague, Dr. Peter H. Raven of Stanford University. Although the Asteraceae is not his main specialty, his contributions to our knowledge of the family are very significant.

Peteravenia R.M.King & H.Robinson, genus novum Asteracearum. Plantae grossae herbaceae vel frutescentes erectae usque ad 4 m. altae, paucae ramosae. Folia opposita longe petiolata, laminis cordatis plerumque serratis. Inflorescentiae laxae paniculatae. Involucri squamae ca. 25 plerumque oblongae inaequilongae 3-4-seriatae; receptacula valde convexa glabra. Flores 18-35 in capitulo; corollae anguste infundibulares 5-lobatae, extus glabrae, cellulis oblongis vel linearibus, parietibus plerumque sinuosis, lobis aequilateraliter triangularibus vel longioribus ad apicem induratis minute scabris, stomatibus nullis; filamenta antherarum in parte superiore angustata, cellulis rectangularibus vel inferne quadratis, parietibus annulate vel intricate ornatis, cellulis exothecialibus plerumque subquadratis, appendicibus antherarum late triangularibus obtusis vel truncatis; styli inferne glabri non vel leniter nodulosi, appendicibus linearibus vel anguste clavatis minute papillosis vel sublaevibus. Achaenia prismatica 4-5-costata setifera, inferne plerumque angustiora; carpopodia aliquantum distincta, cellulis quadratis parietibus tenuibus; pappus setiformis uniseriatus, setis ca. 30 scabris facile deciduis, inferne angustis non vel vix contiguis, superne anguste clavatis, cellulis apicibus acutis. Embryones superne dispositi.

Plants erect, few branched, coarse herbs or shrubs to 4 meters tall. Leaves opposite, distinctly long petioled, blades cordate, usually serrate. Inflorescence a rather loose panicle. Involucre of ca. 25 unequal, oblong phyllaries; in 3-4 series; receptacle highly convex, glabrous, 18-35 flowers per head; corollas narrowly funnellform, 5-lobed, outer surface of corolla glabrous, lobes equilaterally triangular or longer than wide, usually with a cap of short papillae on the tips of the lobes; inner surface glabrous; stomates absent; vascular traces to tips of lobes, anther collar usually slender, composed of rather thin walled rectangular cells with beaded thickenings. Anther appendages with large cells; style base without enlarged node, glabrous. Styler appendage only slightly enlarged, mamilllose, lower part of style branches short papillose. Achenes prismatic, 4-5 ribbed, narrowed below, setiferous, carpopodia distinct, asymmetrical, composed of one to several tiers of thin walled cells, embryo high in the achene, pappus of ca. 30 ? rather deciduous scabrous setae which are narrow below and broadened at tips, apical cells acute, chromosome number determined as $N = 10$ (Raven, unpublished).

Type species: Eupatorium schultzei Schnittspahn

Our studies indicate that the genus contains the following five species.

Peteravenia grisea (Coul.) R.M.King & H.Robinson, comb. nov.
Eupatorium griseum Coul., Bot. Gaz. 20:43. 1895. Guatemala, Honduras, Nicaragua.

Peteravenia malvaefolia (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium malvaefolium A.P.Decandolle, Prodr. 5: 160. 1836. Guatemala, Mexico.

Peteravenia phoenicolepis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium phoenicolepis B.L.Robinson, Proc. Amer. Acad. 35: 338. 1900. El Salvador, Guatemala, Mexico.

Peteravenia rhodochlamydea (A.Gray) R.M.King & H.Robinson, comb. nov. Eupatorium rhodochlamydeum A.Gray, Proc. Am. Acad. 15: 26. 1880. Mexico.

Peteravenia schultzei (Schnittspahn) R.M.King & H.Robinson, comb. nov. Eupatorium schultzei Schnittspahn, Zeitschr. Gartenb. Darmst. 6. 1857. Costa Rica, El Salvador, Guatemala, Honduras, Mexico.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XLII.

A NEW GENUS, EUPATORINA.

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The genus Eupatorina is distinguished from most other genera of the Eupatorieae by the greatly dissected opposite leaves. The single known species is calcicolous and endemic to the island of Hispaniola. The nonpapillose corolla, inornate style base and the rather clavate stylar appendages indicate that the genus is Critonioid. The closest relative seems to be the monotypic genus Antillia (King & Robinson, 1971) of Cuba. The latter genus has oblanceolate undissected leaves, scapose inflorescence, and a short pappus of deeply lacinate scales, Eupatorina seems very reduced in certain features such as the venation of the corolla which does not extend into the lobes. Such a condition is found in very few other species of Eupatorieae.

Eupatorina R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae herbaceae perennes, usque ad 0.5 m altae, paucè ramosae. Folia opposita, laminis profunde bipinnatifidis. Inflorescentiae paniculatae. Involucris squamae ca. 12 inaequilongae 2-3-seriatae; receptacula plana vel leniter convexa glabra. Flores 13-20 in capitulo; corollae anguste infundibulares inferne dilatatae extus superne et in medio glanduliferae et paucè setiferae, cellulis exterioribus oblongis parietibus leniter sinuosis, lobis 5 aequilaterialiter triangularibus intus glabris, stomatibus nullis; filamenta antherarum in parte superiore angustata, cellulis quadratis vel rectangularibus, parietibus parum ornatis, cellulis exothecialibus plerumque subquadratis, appendicibus antherarum late triangularibus truncatis; styli inferne non nodulosi glabri, appendicibus anguste clavatis mamillatis; achenia prismatica 4-5-costata setifera, carpopodia distincta, cellulis quadratis, parietibus tenuibus vel crassiusculis; pappus setiformis uniseriatus, setis ca. 40 scabris persistentibus, cellulis apicalibus subacutis.

Species typica: Eupatorium sophiaefolium Linnaeus

Perennial herbs to 1/2 meter tall, few branched. Leaves opposite, blades deeply bipinnatefid. Inflorescence a panicle. Involucre of ca. 12 rather narrowly oblong subequal phyllaries in 2 series. Receptacle flat to slightly convex, glabrous.

13-20 flowers per head; corollas narrowly funnel-form, 5 lobed, outer surface of corolla with numerous short stalked glands especially on the backs of the lobes and above where the corolla is constricted, stomates absent, lobes about as wide as long, inner surface of corollas glabrous, vascular strands of corolla ending at bases of lobes; anther collar narrow, composed mostly of elongate cells, quadrate cells below, slightly ornate walls; anther appendage large, truncate, composed of rather large elongate cells; style base without enlarged node, glabrous; stylar appendages rather enlarged near the tips, mamillose. Achenes prismatic 4-5 ribbed, setiferous, carpopodia distinct; pappus of ca. 40 scabrous setae, persistent, apical cells of pappus setae acute. Chromosome number not determined.

The genus is monotypic.

Eupatorina sophiaefolia (Linnaeus) R.M.King & H.Robinson, comb. nov. Eupatorium sophiaefolium Linnaeus, Sp. Pl. ed. 2, 1175. 1762-1763. Hispaniola.

Acknowledgement

This study was supported in part by the National Science Foundation Grant - 20502 to the senior author.

Reference

King, R.M. & H.Robinson 1971. Studies in the Eupatorieae (Asteraceae). XLIII. A new genus Antillia. Phytologia 21: 398-399.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XLIII.

A NEW GENUS, ANTILLIA.

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The present monotypic genus represents one of the most distinct endemic Eupatorian elements in the West Indies. The habit is very reminiscent of the Eupatorian genus Ciceronia or even the Mutisian genus Chaptalia with clustered oblanceolate leaves and long scapose inflorescences. Ciceronia clearly differs from Antillia by the reduced anther appendages, the campanulate corollas, the setose pappus and the lack of minute punctations in the walls of the achene. The closest relative of Antillia seems to be the monotypic genus, Eupatorina (King & Robinson, 1971) of the Dominican Republic. Eupatorina differs most obviously by the setose pappus, the non scapose habit, the bipinnately dissected leaves, and the lower insertion of the anther filaments. Antillia and Eupatorina are most alike in the structure of their achenes including the carpodia but have many subtle differences in the shape and pubescence of the corolla and form of the anther. The relationship might not be appreciated but for the geographic proximity.

In view of the structure of the pappus in Antillia, it is remarkable that B.L.Robinson placed the species in Eupatorium. It indicates that as early as 1916, B.L.Robinson had obtained considerable contempt for the genus concepts in the Eupatorieae.

Antillia R.M.King and H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae herbaceae perennes, usque ad 0.2 m altae, paucе ramosae. Folia opposita, laminis oblanceolatis ad marginem crenato-lobatis. Inflorescentiae scaposae laxae perpaucе ramosae. Involucri squamae ca. 25 plerumque oblongae, inaequilongae 2-3-seriatae; receptacula leniter convexa, glabra. Flores 40-50 in capitulo; corollae infundibulares 5-lobatae extus superne et aliquantum in medio glanduliferae paucе setiferae, cellulis exterioribus oblongis parietibus leniter sinuosis, lobis aequilateraliter triangularibus intus glabris, stomatibus nullis, filis vascularibus in lobis prolongatis; filamenta antherarum in parte superiore angustata, cellulis rectangularibus vel inferne quadratis, parietibus leniter nodulosus, cellulis exothecialibus plerumque subquadratis, a appendicibus antherarum late triangularibus truncatis; styli inferne non nodulosi glabri, appendicibus anguste clavatis

mammillatis ad apicem laevibus; achaenia prismatica 7-8-costata, setifera; carpodia distincta, cellulis quadratis, parietibus tenuibus vel crassiusculis; pappis squamae profunde lacinatae persistens, cellulis marginalibus acutis.

Perennial herbs with few short branches bearing clusters of leaves. Leaves opposite, blades oblanceolate, margins crenate-lobate. Inflorescence scapose, very few branched. Involucre of ca. 25 oblong phyllaries unequal in 2-3 series. Receptacle slightly convex, glabrous, 40-50 flowers per head; corollas funnel form, 5-lobed, outer surface of corolla with numerous short stalked glands mostly on backs of lobes and numerous hairs; outer corolla cells oblong with scarcely sinuose walls, backs of lobes not papillose, lobes about as long as wide, stomates absent, inner surface of corolla glabrous, smooth; vascular traces reaching beyond middle of lobes. Filaments inserted well above base of corolla, anther collar composed of quadrate to rectangular cells, cell walls with beaded thickenings, anther appendage large, blunt, composed of rather large elongate cells. Style base without enlarged node, glabrous; stylar appendage only slightly enlarged near the tip, mamillate except at tips. Achenes prismatic, 7-8 ribbed, setiferous, setae most prominent on ribs. Carpodia distinct, pappus a low crown of deeply laciniate scales.

Type species: Eupatorium brachychaetum B.L.Robinson

The genus is monotypic.

Antillia brachychaeta (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium brachychaetum B.L.Robinson, Proc. Amer. Acad. 51:532. 1916. Cuba.

Acknowledgement

This study was supported in part by the National Science Foundation Grant - 20502 to the senior author.

Reference

King, R.M. & H.Robinson 1971. Studies in the Eupatorieae (Asteraceae). XLII. A new genus Eupatorina. Phytologia 21: 396-397.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XLIV.

THE GENUS, RADLKOFEROTOMA.

R. M. King and H. Robinson
Smithsonian Institution, Washington, D.C. 20560.

The genus Carelia Lessing described from southern Brazil in 1832 represents one of the most distinctive elements in the tribe Eupatorieae. For many years the genus remained monotypic, but additional specimens have been collected from both Rio Grande do Sul in Brazil and from Uruguay, and two additional species have been described in this century. The genus has recently been summarized by Cabrera (1957) with a key and descriptions.

The present effort has two functions, first to describe some of the microscopic features of the genus, and second to establish the use of the name Radlkoferotoma Kuntze which was provided for the genus in 1891. As noted by Kuntze, Carelia Lessing is a later homonym, and conservation does not seem likely. There are actually two earlier uses of the name, both in the Eupatorieae, Carelia G. Pongeder ex P.C. Fabricius which equals Ageratum and Carelia A.L. Jussieu ex Cavanilles which equals Mikania. The use of the name Carelia for Ageratum is common in earlier literature and retention of the name in the sense of Lessing is needlessly confusing as well as illegal.

Radlkoferotoma Kuntze, Rev. Gen. 358. 1891.

Erect branching shrubs or small trees. Leaves always opposite, distinctly petioled, blades ovate to elliptical, serrulate. Inflorescence a corymb. Involucre of ca 35 oblong to lanceolate phyllaries in 4-5 series. Receptacle convex, with or without distinct hairs; 35-70 flowers per head, corollas tubular, 5-lobed, outer surface with occasional short stalked glands, stomates absent, lobes slightly longer than wide, inner surface of corolla glabrous, veins of corolla strong; anther collar stout, composed of mostly quadrate cells walls with beaded thickenings. Anther appendage large, blunt or slightly cleft, composed of elongate cells; style base without enlarged node, glabrous, stilar appendages only slightly enlarged near the tip, densely covered with stout erect papillae. Achenes obpyramidal, 4-5 ribbed, setiferous, carpophylls short to rather elongate with thin-walled quadrate cells; pappus a single series of large truncate scales.

Type species: Carelia cistifolia Lessing
Chromosome number not determined.

Our studies of the genus indicate that it contains the following three species.

Radlkoferotoma cistifolium (Lessing) Kuntze, Rev. Gen. 1: 358.
1891. Carelia cistifolia Lessing, Syn. Compos. 156. 1832.
Brazil, Uruguay.

Radlkoferotoma berroi (Hutch.) R.M.King & H.Robinson, comb. nov.
Carelis berroi Hutch. Kew Bull. 1916: 189. 1916. Brazil,
Uruguay.

Radlkoferotoma ramboi (Cabrera) R.M.King & H.Robinson, comb.
nov. Carelia ramboi Cabrera, Bol. Soc. Argent. Bot. 6: 240.
1957. Brazil.

References

- Cabrera, A.L. 1957. El Genero Carelia (Compositae). Bol. Soc. Argent. Bot. 6: 240.
- Kuntze, O. 1891. Rev. Gen. 358.
- Lessing, C.F. 1832. Synopsis generum Compositarum. 156 p.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB- 20502 to the senior author.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). XLV.

A NEW GENUS, FLEISCHMANNIOPSIS.

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Among the Mexican and Central American species superficially resembling Critonia, are three that are very distinct in a number of characters including their pappus and carpopodia. We apply the name Fleischmanniopsis to these species because of the marked resemblance of parts of the achene and corollas to those of Fleischmannia. The very distinct tapering, strongly rimmed carpopodia with thick walled cells are exactly like those found otherwise only in the genus Fleischmannia. The entirely slender usually slightly separated pappus setae are also alike in the two genera. The similarity in overall shape of the corolla further indicates the possibility of relationship. At this time, however, the question of relationship of Fleischmannia remains unresolved.

Some features of Fleischmanniopsis are certain at this time. The resemblance to Critonia is supported by such Critonioid features as smooth corolla lobes and a glabrous unenlarged style base. The genus is distinct from Critonia by the form of the carpopodium with its thick walled cells, by the slender pappus setae, by the veins of the corolla not reaching into the lobes, and by the reduced anther appendage. The genus is even more distinct from Fleischmannia by its smooth corolla lobes, short corolla veins, reduced anther appendages, less papillose style branches with clavate tips, fewer flowers per head and more imbricate phyllaries. Even the anther collars show some shorter more quadrate cells toward the base unlike the condition in Fleischmannia.

The short veins of the corollas of Fleischmanniopsis reach only to the sinuses between the lobes. This seems to be a reduced condition that is made possible by the small size of the flowers. Another genus showing this type of venation is Eupatorina (King & Robinson, 1971) of Hispaniola. There seems to be no close relationship between the genera.

Fleischmanniopsis R.M.King & H.Robinson, genus novum Asteracearum (Eupatorieae). Plantae herbaceae, erectae paucè ramosae. Folia opposita longe petiolata, laminis ovate lanceolatis serratis. Inflorescentiae paniculatae. Involucri squamae 15-20 valde inaequilongae 3-5 seriatæ; receptacula plana vel leniter convexa glabra. Flores 5-10 in capitulo; corollae

anguste infundibulares 5-lobatae, extus glabrae, cellulis oblongis vel linearibus, parietibus sinuosis, lobis aequilateraliter triangularibus ad apicem minute paucis papillois, stomatibus nullis, filis vascularibus infra lobes terminatis; filamenta antherarum alte inserta, in parte superiore angustata, cellulis rectangularibus vel inferne quadratis, parietibus nodulosis vel annulate ornatis, cellulis exothecialibus, plerumque subquadratis vel latioribus, appendicibus antherarum brevibus obtusis vel emarginatis; styli inferne glabri non nodulosi, appendicibus leniter vel abrupte clavatis inferne mamillosis superne sublaevibus. Achaenia prismatica 4-5-costata vix setifera; carpopodia valde distincta, cellulis quadratis parietibus crassis; pappus setiformis uniseriatus, setis 30-40 tenuis non vel vix contiguas scabris persistentibus, cellulis apicibus acutis.

Erect herbs. Leaves opposite, distinctly long petioled, blades ovate-lanceolate, usually serrate. Inflorescence a panicle. Involucre of 15-20 very unequal phyllaries; in 3-5 series; receptacle flat or slightly convex, glabrous, 5-10 flowers per head; corollas narrowly funnellform, 5-lobed, outer surface of corolla glabrous, cells oblong to linear with sinuous walls, lobes about as long as wide, with short papillae only at the tips; inner surface glabrous; stomates absent; veins of corolla reaching only to sinuses between lobes; anther collar slender, composed of rectangular or quadrate cells, walls with beaded or annulate thickenings; anther appendage small, sometimes emarginate, composed of large cells. Style base without enlarged node, glabrous. Styler appendage very much enlarged at the tips, mamilliose, lower parts of style branches short papilliose. Achenes prismatic, 4-5 ribbed, glabrous except for a very few setae, carpopodia very distinct, with upper rim, composed of several tiers of short thick-walled cells, pappus of 30-40 scabrous persistent setae in one series, apical cells acute.

Type species: Eupatorium leucocephalum Benth m

Our studies of the genus indicate that it contains the following three species.

Fleischmanniopsis leucocephala (Benth) R.M.King & H.Robinson, comb. nov. Eupatorium leucocephalum Benth, Pl. Hartw. 86. 1841. El Salvador, Guatemala, Honduras, Mexico.

Fleischmanniopsis mendax (Standley & Steyermark) R.M.King & H.Robinson, comb. nov. Eupatorium mendax Standley & Steyermark, Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. 23: 185. 1944. Guatemala.

Fleischmanniopsis nubigenoides (B.L.Robinson) R.M.King &
H.Robinson, comb. nov. Eupatorium nubigenoides B.L.Robinson,
Proc. Am. Acad. 54: 618. 1909. Guatemala.

Acknowledgement

This study was supported in part by the National Science
Foundation Grant - 20502 to the senior author.

Reference

King, R.M. & H.Robinson 1971. Studies in the Eupatorieae (Aster-
aceae). XLII. A new genus, Eupatorina. Phytologia 21:
396-397.

MISCELLANEOUS ADDITIONS AND REVISIONS TO THE FLOWERING PLANTS

OF JAMAICA III

C. D. ADAMS

ACANTHODESMOS (COMPOSITAE)

ACANTHODESMOS C. D. Adams & M. C. duQuesnay, gen. nov.

Gemus in tribu Vernonieae sed absque affinitate collocatus.

Capitula lateralialia vel foliis opposita, sessilia, lappacea, homogama, tubuliflora, floribus omnibus hermaphroditis. Involucri bracteae pluri-seriatae imbricatae aculeatae apicem versus glandulosae. Receptaculum paleaceum. Corollae aequales, regulares, lobis extus glandulosi. Antherae basi caudatae. Stylus filiformis, apicem versus leviter incrassatus; styli rami breves acuti patentest. Achaenia turbinata, pauci-angulata, 10-costata, glabra. Pappus uniseriatus paleis inaequalibus acutis apicem glandulosi.

ACANTHODESMOS DISTICHUS C. D. Adams & M. C. duQuesnay, sp. nov.

Suffrutex perennis ramis effusis usque 1 m longis; rami primarii tenues hornotini villosi dense glandulosi glabrescentes cinerascetes, valde monopodiales, internodiis ca. 2 cm longis; ramuli distichi coplani vel ascendentes usque 20 cm longi. Folia alterna disticha, anguste oblonga, 4-7 (-8) cm longa, 8-14 mm lata, basi inaequales, margine plus minusve sinuata et remote denticulata, apice acuta pungentia, adaxiale initio appresso-pubescentia glandulosaque demum asperata, subtus dense albido-tomentosa costa prominenti, venis lateralibus pinnatis utroque latere 10-12 item prominentibus; petiolus minus quam 3 mm longus, late alatus, per porcam circum nodum versus spinam vel phyllarium infimum in positione folio-opposita conjugatus. Nodi steriles spinis (cum phyllariis cognatis) (1-) 2-5 curvatis acicularibus usque ca. 12 mm longis armati. Capitula folio-opposita, sessilia. Involucri bracteae 15-16, extimae usque 12 mm longae pro parte majore (9 mm) seta rigida pungenti purpurascenti, gossypinae. Receptaculi paleae 11-12, involucri bracteas similes sed breviores oblongae acuminatae acutaeve. Flosculi in quoque capitulo 12-13. Corolla 5-partita extus glandulosa; tubus 4-5.5 mm longus, albidus; lobi 3.5-5 mm longi, intus malvini (HCC 637). Antherae apices hyalini, basibus oblongo-caudatis. Pollen breviter spinosum incolor. Stylus 12-15 mm longus pilis brevibus ascendentibus squarrosisque, basi albus alibi purpureus; styli rami 0.3-0.4 mm longi patentest acuti purpurei. Achaenia obconica 1.6-2 mm longa, obscure angulata, 10-costata, glandulosa cetero laevia. Pappi paleae inaequales 0.7-1.8 mm longae plus minusve connatae. Fig. 1, a-f.

Type Collection: C. D. Adams 13056 (holotype UCWI; isotypes BM, GH, K, USNM), in salina margin thicket, Portland Cottage, Clarendon Parish, Jamaica, elev. near sea-level, 6 November 1968 (plant in flower).

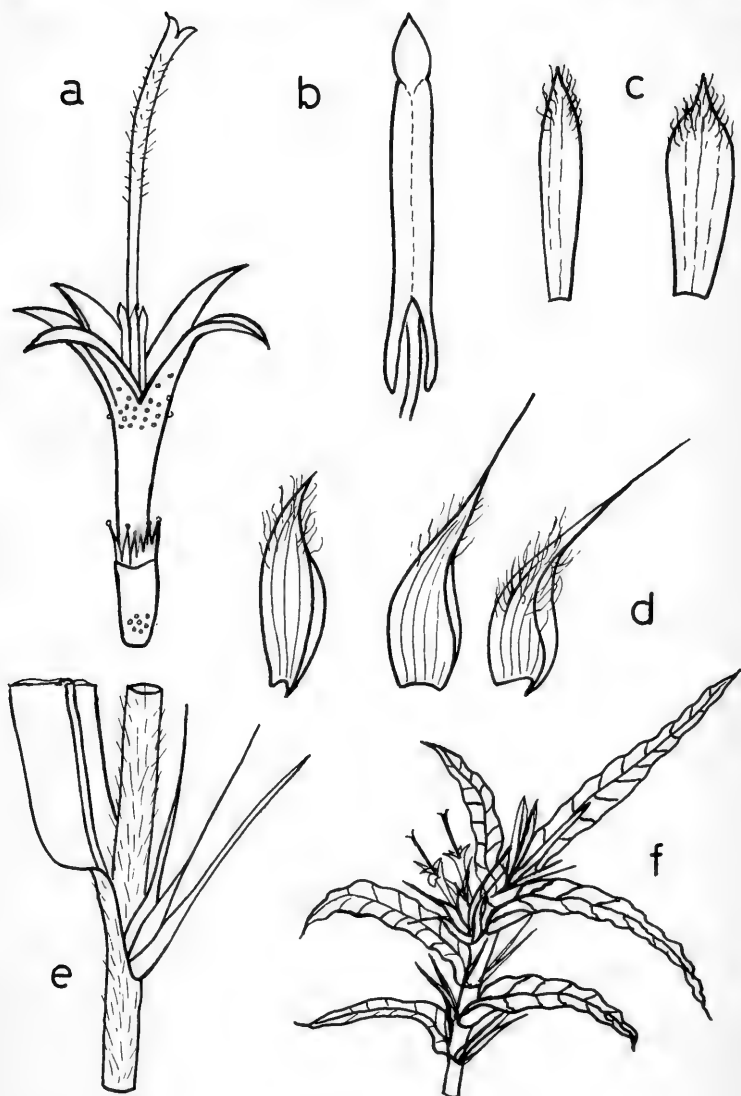


Fig. 1 a-f *Acanthodesmos distichus*

Paratypes: C. D. Adams 12999 (BM, UCWI), type locality as above, 7 May 1967 (plant in flower and fruit); G. R. Proctor 31173 (IJ), type locality as above, 2 January 1970 (plant in flower and fruit).

The affinities of Acanthodesmos are not at all clear. When first discovered the plant was thought to belong to Mutisieae and to be related to Anastrophia or Gochnatia, but the nature of the pappus and the presence of receptacle-scales is not consistent with that identification. Another feature suggesting Mutisieae, besides the caudate anther-bases and short style-arms, was the apparent unequal lobing of the corolla, but the corolla-lobes only sometimes adhere and are not in fact unequally connate.

The decision to place this new genus in Vernonieae was made after an assessment of the pappus-scales, the shape and colour of the corolla and the glands on it, the pollen, the pointed tips of the style-arms and the indumentum of the stems and leaves. In the description, the capitula are treated as simple, but it is possible to interpret the flower-head of Acanthodesmos as a compound one in which all traces of the involucre of the first order have been lost. Such an interpretation would place the new genus in Lychnophoreae, perhaps close to Rolandra and Spiracantha, genera represented in our area and sharing some vegetative features with our new plant.

The unique nodal spines are obviously vestigial outer involucre bracts. The connections across the node from the base of the outer spine to the opposed leaf-base provide the inspiration for the new name. If these spines are the homologues of the outer phyllaries of compound heads, they may belong to a morphic series at a level closer to true leaves and thus explain their persistence at nodes, presumably on reduced branches. The genus also has some characters which are suggestive of cynarioid and imuloid affinities.

The salina thicket in which this plant occurs is typical of the microphyllous woody vegetation which occurs widely in the arid parts of southern Jamaica; the poor drainage and high salinity of the clay soils of the salina-margins favour these species which were found associated with Acanthodesmos:— the trees and shrubs Conocarpus erectus, Caesalpinia vesicaria, Coccoloba krugii, Crossopetalum rhacoma, Croton linearis, Coccothrinax jamaicensis, Brya ebenus, Jacquinia arborea, Haematoxylum campechianum, Picrodendron baccatum and the climbers Commicarpus scandens, Urechites lutea, Marsdenia macfadyenii, Cynanchum albiflorum and the common seashore grass Sporobolus virginicus.

Explanation of Figure 1: a. Floret, X5; b. Anther, X15; c. Receptacle-scales, X5; d. Inner phyllaries, X5; e. Stem-node, X3; f. Habit, X1.

CHLORIS (GRAMINEAE)

CHLORIS DANDYANA C. D. Adams, nom. nov.

Chloris polydactyla Sw., Nov. Gen. & Sp. Pl.: 26. 1788.Andropogon polydactylos L., Sp. Pl. ed. 2, 2: 1483,
1763, nom. illegit.Chloris barbata (L.) Nash in Bull. Torr. Bot. Club 25:443. 1898. Andropogon barbatus L., Syst. Nat. ed 10,
2: 1305. 1759, non Chloris barbata Sw., Fl. Ind. Occ.
1: 200. 1797.

Mr. J. E. Dandy has pointed out that the common tropical American grass, hitherto known as Chloris polydactyla, is without a legitimate name. It gives me great pleasure to name this handsome perennial grass for him, not only in gratitude for the considerable help he has given me in solving problems concerning Jamaican plants but also in recognition of his outstanding contributions to botanical nomenclature generally.

EUPATORIUM (COMPOSITAE)

EUPATORIUM CONTORTUM C. D. Adams, sp. nov.

E. tristi DC. simile sed involucri bracteis lanceolatis acuminatis et foliorum in petiolis basibus decurrentibus.

Frutex 1.5 m altus, ramis laxis; internodia 4-5 cm longa dense puberula glandulosaque. Folia ovata vel ovato-lanceolata, basi cuneata et in petiolis anguste decurrentia, marginibus parum crenatis, apice longe acuta, in nervo medio et subter puberula. Inflorescentia multo ramosa, potius laxa, corymbosa, 8-12 cm lata, dense puberula, pedunculis flexilibus. Involucra numerosa stipitata ca. 5-6 mm longa, bracteis 8-10, 2-seriatis, saepe contortis, lanceolatis acuminatis glandulosis puberulis, exterioribus 2.5 mm longis, interioribus usque 5.5 mm longis. Flosculi ca. 10; corolla hypocrateriformis, alba, tubo ca. 3 mm longa. Achaenia linearia, 3 mm longa, plerumque 5-angulata, nigra puberula; pappus 1.5-2.5 mm longus.

Type Collection: R. A. Howard, G. R. Proctor & B. L. Wagenknecht 20512 (holotype IJ; isotype UCWI), on wooded limestone hilltop, Stirling Castle Forest Reserve, near the Aljam tramline, St. Ann Parish, Jamaica, elev. ca. 2000 feet, 7 January 1960; "Shrub 1.5 m tall, with lax branches; heads white."

This rare plant, at present known only from the type, is distinguished by its lax growth and the loose inflorescence of numerous twisted heads.

EUPATORIUM CRITONIFORME Urb. var. PUBESCENS C. D. Adams, var. nov.

Inflorescentiae rami pubescentes.

Type Collection: G. R. Proctor 28401 (holotype IJ), in rocky thickets beside river, near site of Nanny Town in gorge

of the Stony River, Portland Parish, Jamaica, elev. 1700-1900 feet, 26 July 1967; "Shrub 3.5 m tall."

Paratype: J. P. 1360 (UCWI).

Eupatorium critoniforme Urb. is a species very easily distinguished by the long-acuminate leaves with translucent lines accompanying the veins only and by the cylindrical corolla with very short lobes; the variety critoniforme has the inflorescence glabrous.

EUPATORIUM HARDWARENSE G. R. Proctor ex C. D. Adams, sp. nov.

E. tetrantho Griseb. simile sed capitulis multo majoribus et foliis latioribus; praesentia glandium E. simile Proctor simulans sed capitulis majoribus et flosculis pluribus differt.

Frutex scandens. Folia late ovata, basi truncato-subcordata, repando-dentata, breviter acuminata, usque ad 9 cm longa et 8 cm lata, tripli-sub-5-nervata, in superficiebus ambabus glandibus parvis luteis. Inflorescentia corymbosa omnino dense puberula. Involucri numerosa ad apices ramulorum in fasciculis parvis sessilia, campanulata, bracteis ca. 16, 3-4-seriatis, multo inaequalibus, ovatis oblongo-ovatisque, intimis longissimis usque 4.5 mm. Flosculi ca. 10, olivacei. Achaenia 1.7-2.3 mm longa, glandulosa.

Type Collection: G. R. Proctor 22970 (holotype IJ; isotype UCWI), in montane rain-forest, along the waterfall trail north of Hardwar Gap, Portland Parish, Jamaica, elev. ca. 3900 feet, 25 November 1962; "High-climbing vine; heads pale greenish-brown."

There are three species of high-climbing Eupatoriums in the middle elevation woodlands of Jamaica, all of them endemic as far as we know. E. hardwarense has flower-heads about 5 mm long, whereas those of E. tetranthum Griseb. and E. simile Proctor are only about half that size.

VERNONIA (COMPOSITAE)

VERNONIA VERTICILLATA G. R. Proctor ex C. D. Adams, sp. nov.

Species nova in sectione Lepidoploa sed absque affinitate manifesta.

Frutex usque 2.5 m altus ramis effusis arcuatis obscure striatis angulatisque, leviter puberulis, glabrescentibus. Folia in eodem ramo quoad dispositionem variabilia, infima et summa alterna, in medio opposita vel 3-4-verticillata; laminae ovatae vel oblongo-obovatae, basi rotundatae, apice acuminatae, integrae, leviter puberulae, supra nitentes pervirides, subter glanduloso-punctatae, in quoque latero venis lateralibus 5-7, 3-7 cm longae, 1.5-5 cm latae. Petioli usque ad 2 mm longi. Capitula sessilia caulis principalis ad nodos superos vel in ramis elongatis in fasciculis parvis bracteis foliaceis subtentis. Involucrum turbinatum ca. 8 mm longum, bracteis imbricatis 6-7-

seriatis lanceolatis acutis, dorsalibus convexis, glumaceis, pubescentibus ad apicem glandulosis, extimis brevissimis, intimis ca. 6 mm longis. Flosculi ca. 7. Corolla 5 mm longa, purpurea, glandulosa. Achaenia 1.5 mm longa, leviter 10-costata, setis ascendentibus; pappi paleae exteriores pallidae 1-1.5 mm longae, setae interiores fuscae 5-6 mm longae.

Type Collection: G. R. Proctor 22987 (holotype IJ; isotype UCWI), on wooded limestone hilltop, White Rock Hill, ca. 1 mile south of Sweet Water, St. James Parish, Jamaica, elev. 2000-2200 feet, 2 December 1962; "Small spreading shrub; flowers bright purple."

Paratype: G. R. Proctor 24715 (IJ), on steep rocky limestone hillside, Glencoe district, 1 mile south-east of Stonehenge, St. James Parish, Jamaica, elev. 1400-2048 feet, 21 March 1964; "Slender arching shrub to 2.5 m tall."

The whorled leaves at least at the middle nodes of the stem distinguish this Vernonia quite clearly from any species hitherto reported from the West Indies.

SOPHORA IN HAWAII

Otto & Isa Degener

A letter from Dr. Ronald Melville of Kew, dated January 13, 1971, regarding the present status of the endemic Sophorae of the Hawaiian Archipelago, induced us to write the present article.

Hillebrand's Flora of the Hawaiian Islands, published posthumously in 1888, on page 108 describes a single endemic species of Sophora, namely S. chrysophylla (Salisb.) Seem., for the Hawaiian Archipelago. He locates the species on "Hawaii! Maui! Kauai!" The writers, and some other local botanists, know the genus from the Islands of Oahu, Molokai and Lanai as well. Mr. Alvin K. Chock, as a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Botany at the University of Hawaii, published the results of his two year study of Hawaii Sophorae in Pacific Science 10:136-158 in 1956. The Degener collection deposited at the Field Museum was mailed him in January 1954 to aid him in his studies.

Counting such names as Sophora chrysophylla (Salisb.) Seem., and Sophora chrysophylla ssp. glabrata var. ovata subvar. ovata f. maunakeaensis Chock, the monographer recognizes as valid for the Archipelago 1 species, 4 subspecies, 11 varieties, 5 subvarieties and 12 forms. We are less conservative and judge the Islands to harbor more than one species, such as Sophora grisea Deg. & Sherff (in Sherff, Bot. Leaflet 5:24. 1951.) and S. unifoliata (Rock) Deg. & Sherff (ibid. p. 25), as well as one each from the Islands of Lanai and Molokai. We believe, also, the monographer should have considered character of legume of greater taxonomic importance. We consequently here are changing to different taxonomic ranks:

1. SOPHORA LANAIENSIS (Chock) Deg. & Deg.

Sophora chrysophylla sensu Rock, Indig. Trees Haw. Isl. 189. 1913. "A few small trees were found on Lanai just above the homestead of the former manager of the Lanai Ranch Co., in a small gulch all by themselves. Whether they were planted there by human hand or by birds cannot be ascertained, but the former may be more reasonable, as they were not found elsewhere on Lanai."

Not Sophora chrysophylla Seem. Fl. Vit. 66. 1865. "Insulis Sandwich, legit A. Menzies." (Brit. Mus.)

Sophora chrysophylla var. glabrata sensu Rock, Leg. Pl. Haw. 123. 1920. (Lanai.)

Not Edwardsia chrysophylla var. glabrata A. Gray in U.S. Expl. Exp. 429. 1854. (Hawaii.)

Sophora chrysophylla ssp. glabrata var. lanaiensis Chock in Pac. Sci. 10:147. 1956. (Lanai.)



Sophora lanaiensis (Chock) Deg. & Deg.

Symmetrically round lacy tree with many branches arising from short erect trunk and bearing numerous long slender twigs longitudinally sulcate and during first year antrorsely appressed-golden-strigose. Leaves commonly with 7 - 10 mm. long petiole and 50 - 80 mm. long rachis both deeply narrowly grooved above and golden-strigose; leaflets about 13, opposite to alternate, the smallest below and the largest above on leaf, 10 - 30 mm. long, 4 - 11 mm. wide, oblong-oblancoolate, cuneate to minutely abruptly rounded to petiole 1 mm. long or less, broadly rounded to somewhat truncate and emarginate with usually faint mucro at apex, golden-strigose especially beneath. Flowers up to 7 or even 9 per 5 - 10 mm. long inflorescence, on 10 mm. long pedicels having 1 mm. long incurved boat-shaped subulate bract at base. Calyx 8 mm. long from base to shallowly 5-dentate limb, with single 3 mm. deep sinus, strigose-pubescent without, glabrous within. Corolla: standard 26 mm. long, 9 mm. wide, the ovate-elliptic limb at apex somewhat obtuse and barely retuse; wings with 4 mm. long claw and 18 mm. long 5 mm. wide limb having obliquely truncate base and somewhat rounded apex; keel petals with claw 4 mm. long but blade 24 mm. long and 6 mm. wide, connate for 10 mm. near middle of lower margin, with acuminate apex. Stamens about 20 mm. long, abruptly dilated at base, glabrous. Pistil 25 mm. long, terete, strigose-pubescent except for thinner anterior fifth. Legume dark brown, somewhat glossy, straight, indehiscent, commonly 60 - 100 mm. long, with slightly curved 5 - 15 mm. long caudate apex; sterile basal part 5 - 20 mm. long, golden-strigose; fertile part more or less moniliform with 5 - 9 one-seeded segments 7 - 10 mm. long, 6 - 8 mm. wide, about 4 mm. thick, glabrate to somewhat strigose-pubescent, with 2 rows of 2 - 3 mm. separated rough 1 mm. high wings bordering narrow sides of pod, wings less prominent between seed-bearing areas; in case no seed develops the area remains sublinear. Seeds yellowish brown, smooth, glossy, thick, elliptic-globose, 5 - 6 mm. long, 3 mm. thick, hardly compressed.

The type, deposited in the Marie C. Neal Herbarium of the Bernice P. Bishop Museum, was collected by Rock "On the plateau leeward side, near Koele, back of Gibson [Walter Murray Gibson, 1822-1888] Homestead, flowering and fruiting July 29, 1910. George Campbell Munro (May 10, 1866 - Dec. 4, 1963), who was manager of most of the Island of Lanai for many years and saved much of its endemic vegetation from herbivores, wrote voluminous notes concerning Lanai plants about 1927. From a transcription we took a few years before his death, we find: "Sophora chrysophylla glabra, Rock. Native name ma-mane. Not common, found most commonly on the Kaluanui bench, one plant at Kanepuu from which a number are now growing." Chock cites a plant collected by Munro April 16, 1919, deposited in the Bishop Museum and in NY, from Kalyanui. In a letter to us of July 25, 1957, Mr. Munro wrote us expressly that S. chrysophylla and the var. glabrata grew on Lanai. In fact, regarding the latter, "Rock described this. I did not see it." Munro collected 950 Lanai specimens of ferns and flowering plants, which C.N. Forbes determined. A set

went to the Bishop Museum; another to the Hawaiian Sugar Planters Experiment Station; and the rarest (letter of Oct. 14, 1950) to the "British Museum, Sydney, Australia."

Thanks to the courtesy of the Dole (Pineapple) Company which rented us a cottage, we resided in 1963-64 for about six months on Lanai to botanize. During this lengthy stay, we discovered just mauka of the pineapple fields presumably the last stand of Sophora lanaiensis, beautifully rounded, bright green, lacy trees. About 75 herbarium specimens from this colony are being widely distributed under the following label: "Deg. & Deg. 31,383. Almost extinct! (4 thriving, spreading, 3 m. high trees with many branches arising from low trunk; prolific seeder but not a single seedling because of thick mat of Melinis grass; petals canary yellow; filaments whitish; anthers yellow; pistil greenish yellow.) Kaluanui Bench, Lanai. Decadent, dryish forest with deer browse line. Jan. 24, 1964." Today, with Lanai practically a hunting preserve stocked with feral goat, axis deer, mouflon and pronghorn, we surmise the four trees are no more. At least voucher specimens exist to show how beautiful a creation this species had been. The above description is based on No. 31,383, healthy trees with 5 - 9 seeds per legume; very rarely, perhaps due to faulty pollination, down to only one. Chock's description gives "the pod 1 - 5 seeded".

2. SOPHORA MOLOKAIENSIS sp. nov., nom. nud.

June 1, 1961, with Mr. Noah Pekelo, Jr., we drove to Maunahui, Molokai, and from there took a foresters' jeep road makai eastward to the lower edge of the rainforest. Here we discovered a rather gnarled, ugly mamane new to Science. We collected abundant material and, since Mr. Chock had published on the genus, turned over all our specimens to him. We intended to publish jointly, after a proper drawing had been executed. Before that could be accomplished, Mr. Chock and family removed to the Mainland and the package of specimens lies somewhere in the Museum where, no one knows. We believe this species extinct because, when we collected specimens from the plant in 1961 the area, thanks to the jeep road, was being bulldozed in strips for the planting of Pinus taeda to foster a lumber industry. Eventually, after the herbarium specimens have come to light, we shall properly publish an illustrated description.

The taxa with more or less unifoliolate leaves we prefer to alter in name as follows:

3. SOPHORA UNIFOLIATA (Rock) Degener & Sherff, s.s.

Sophora chrysophylla var. unifoliata Rock in Haw. Bd. Commrs. Agri. & For., Div. For., Bot. Bull. 5:44. 1919.

Edwardsia unifoliata Degener, Fl. Haw. Fam. 169c. 1932.

Sophora unifoliata Deg. & Sherff in Sherff, Bot. Leaflet. 5:24. 1951.

Sophora chrysophylla ssp. unifoliata Chock in Pac. Sci. 10:155. 1956.

This taxon, now apparently extinct, grew in the Puuwaawaa region of Hawaii.

3a. SOPHORA UNIFOLIATA var. ELLIPTICA (Chock) Deg. & Deg.

Sophora chrysophylla ssp. unifoliata var. elliptica Chock in Pac. Sci. 10:156. 1956.

This taxon, known from Degener, Bertram & Clay 19,327, was collected in 1948 at Hukukano, East Maui.

3b. SOPHORA UNIFOLIATA var. KANAIOENSIS (Chock) Deg. & Deg.

Sophora chrysophylla ssp. unifoliata var. kanaioensis Chock in Pac. Sci. 10:156. 1956.

This taxon, collected by Forbes in 1920 and by Degener in 1952, is apparently endemic to the neighboring area at Kanaio, East Maui.

So few in the Hawaiian Islands realize the scientific value of our endemics, and ruthlessly destroy them to gain a few pounds of venison or board feet of lumber. Our protests fall on deaf ears. Perhaps some of our akamai legislators and citizens will heed Dr. Melville's statement in his letter to us: "It appears to me that Sophora chrysophylla is an extremely interesting example of diversification in a plant species comparable with that of the Darwin Finches in the Galapagos, and I think this comparison could be made use of in urging the conservation of this species."



The extinct (?) Molokai Sophora collected June 1, 1961.

MORE NEW PIPEWORTS FROM BRAZIL, A CHASTETREE FROM CEYLON, AND
NEW NAMES IN PREMNA

Harold N. Moldenke

ERIOCAULON MODESTUM var. BREVIFOLIUM Moldenke, var. nov.

Haec varietas a forma typica speciei foliis 1--2.5 cm. longis, pedunculis usque ad 37 cm. longis, et bracteis involucrentibus ad apicem valde longeque attenuatis recedit.

This variety differs from the typical form of the species in having its leaves only 1--2.5 cm. long and 1--2 mm. wide at the midpoint, its peduncles 19--37 cm. long, and its involucre bracts more attenuate at the apex.

The type of the variety was collected by H. S. Irwin, J. W. Grear, Jr., R. Souza, and R. Reis dos Santos (no. 13781) on a creek bank, at 1200 m. altitude, about 5 km. south of Cristalina, Goiás, Brazil, on March 8, 1966, and is deposited in my personal herbarium at Plainfield, New Jersey.

PAEPALANTHUS AMOENUS f. PROLIFER Moldenke, f. nov.

Haec forma a forma typica speciei capitulis foliaceo-proliferis recedit.

This form differs from the typical form of the species in having its flower-heads proliferating into mostly or only leaf-like structures which are strictly erect, fascicled, stiff, subcoriaceous, brownish-olive in color, long-ciliate along the margins, otherwise glabrous, acuminate-aristate at the apex, mostly 8--10 mm. long but usually with one much longer (1.5--2.5 cm. long) than the rest in each head.

The type of this remarkable form was collected by Henrique Lahmeyer de Mello Barreto (no. 2491) at Acebe Mundo, in the Serra do Curral, Municipality of Bello Horizonte, Minas Gerais, Brazil, on March 10, 1933, and is deposited in the Britton Herbarium at the New York Botanical Garden.

PAEPALANTHUS PHAEOCEPHALUS var. FOLIOSUS Moldenke, var. nov.

Haec varietas a forma typica speciei foliis caulinis arcte confertis et foliis basalibus rigidis non conduplicatis recedit.

This variety differs from the typical form of the species in having its basal leaves stiff and not conduplicate and its cauline leaves very numerous, closely appressed, and overlapping.

The type of the variety was collected by H. S. Irwin, R. Souza, and R. Reis dos Santos (no. 11368) in wet places in cerrado, at an altitude of 1000 m., at Chapada da Contagem, about 10 km. east of Brasília, Distrito Federal, Brazil, on December 17, 1965, and is deposited in my personal herbarium at Plainfield, New Jersey. In habit this plant greatly resembles P. applanatus Ruhl., but its flower-heads are those of P. phaeocephalus Ruhl.

PAEPALANTHUS SUBFALCATUS var. **VILLOSUS** Moldenke, var. nov.

Haec varietas a forma typica speciei foliis brevioribus latioribusque et pedunculis dense patenteque cinereo-villosis recedit.

This variety differs from the typical form of the species in having its leaves shorter and broader, 7–9.5 cm. long and 1–1.2 cm. wide at the midpoint, and its peduncles very densely and conspicuously spreading-villous with grayish hair.

The type of the variety was collected by H. S. Irwin, S. F. de Fonsêca, R. Souza, R. Reis dos Santos, & J. Ramos (no. 28201) in a campo in an area of campo, cerrado on outcrops, and wooded valley, at 1200 m. altitude, about 3 km. north of São João Chapada, in the Serra do Espinhaço, Minas Gerais, Brazil, on March 24, 1970, and is deposited in my personal herbarium at Plainfield, New Jersey.

SYNGONANTHUS CAULESCENS var. **DOURADENSIS** Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrentibus stramineis latiore lanceolatis recedit.

This variety differs from the typical form of the species in having its involucre bracts stramineous and more broadly lanceolate.

The type of the variety was collected by H. S. Irwin, R. Souza, and R. Reis dos Santos (no. 11753) in shallow water in an area of campo and cerrado on the sandstone summit of Serra Dourada, at 800 m. altitude, about 20 km. southeast of Goiás Velho, Goiás, Brazil, on January 18, 1966, and is deposited in the Britton Herbarium at the New York Botanical Garden.

SYNGONANTHUS GRACILIS var. **LATIFOLIUS** Moldenke, var. nov.

Haec varietas a forma typica speciei foliis 2 mm. latis arcte appressis recedit.

This variety differs from the typical form and from all other described varieties of the species in having its basal leaves very numerous, closely appressed to the ground, and uniformly about 2 mm. wide at the midpoint.

The type of the variety was collected by H. S. Irwin, J. W. Grear, Jr., R. Souza, and R. Reis dos Santos (no. 16349) in a gallery margin, at 550 m. altitude, about 86 km. north of Xavantina, Mato Grosso, Brazil, on May 31, 1966, and is deposited in the Britton Herbarium at the New York Botanical Garden.

PREMNA ODORATA f. **CRENULATA** Koord. & Val., f. nov.

Haec forma a forma typica speciei laminis foliorum irregulariter sed argute crenato-serratis recedit.

This form differs from the typical form of the species in having the leaf-blades rather irregularly but sharply crenate-serrate from almost the base to the apex. It is described under P. tomentosa Willd. in Koord. & Val., Bijdr. Boomscoort. Java 7: 181 (1900) and numerous specimens were annotated by Koorders and Valeton in the Buitenzorg Herbarium as P. tomentosa var. crenulata and P. tomentosa f. crenulata Koord. & Val., but I have not yet been able to determine where (if at all) they formally published either of these tri-

nomials. All the twenty-one sheets of this form in the Buitenzorg Herbarium (and I have not found it represented in any of the other thirty-seven herbaria in which I have examined the material of P. odorata) seem to represent young sterile branches, so it may well be, as Koorders & Valeton suggest, that this is merely a juvenile state of the species, although in that case it is passing strange that it should be found only in Java, Sumatra, and Timor and never to have been observed (and collected) anywhere else in the rather extensive range of the species from Nepal and India east to New Guinea!

The type of the form was collected by Sijfert Hendrik Koorders (no. 9725b) in Java, and is deposited in the Herbarium Bogoriense at Buitenzorg.

PREMNA ODORATA var. *DETERGIBILIS* (C. B. Clarke) Moldenke, comb. nov.

Premna tomentosa var. detergibilis C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 576. 1885.

PREMNA ODORATA var. *PIERREANA* (Dop) Moldenke, comb. nov.

Premna tomentosa var. pierreana Dop in Lecomte, Fl. Gén. Indo-Chine 4: 808. 1935.

VITEX LEUCOXYLON var. *ZEYLANICA* Moldenke, f. nov.

Haec varietas a forma typica speciei foliolis minoribus 2.5--9 cm. longis 1.3--3.5 cm. latis plusminus irregulariter serratis recedit.

This variety differs from the typical form of the species in having its leaflets averaging smaller, 2.5--9 cm. long and 1.3--3.5 cm. wide, more or less serrate with irregularly placed, often remote, appressed, antrorse teeth toward the apex or only undate-repand, dull gray-green above in drying, the veinlet reticulation usually conspicuous and obtusely subprominent above. Usually it is only the larger leaflets that exhibit the teeth.

The type of the variety was collected by D. Mueller-Dombois & N. Balakrishnan (no. 68091211) in "sedge-wewa", associated with Zyzygium sp. in temple ruins at Wilpattu National Park, Ceylon, between Weerakuti Villu and Maduru Odai, a little north of Hindu, at 100 meters altitude, on September 12, 1968, and is deposited in the United States National Herbarium at Washington. Of the many specimens of this well-known species examined by me in twenty-one herbaria, this is the first collection to exhibit serrate leaves. The specimen is in fruiting condition, so in this case probably cannot be dismissed as a seedling, sucker, or juvenile condition.

BOOK REVIEWS

Alma L. Moldenke

"ROOT DISEASES AND SOIL-BORNE PATHOGENS" edited by T. A. Toussoun, Robert V. Bega & Paul E. Nelson, v & 252 pp., illus., University of California Press, Berkeley, California 94720, Los Angeles, California and London. 1970. \$18.00.

The preface announces that "this volume is the product of the Second International Symposium on Factors Determining the Behavior of Plant Pathogens in Soil, held in London, England July 14-28, 1968, in conjunction with the First International Congress of Plant Pathology. It is the successor to the volume 'Ecology of Soil-Borne Plant Pathogens: Prelude to Biological Control' edited by Kenneth F. Baker and William C. Snyder [1965], and presents new knowledge that has accumulated in the interim as well as subject matter not treated in the first volume."

The book is composed of Parts: I introduction surveying recent ecological advances in soil-borne plant pathogens, II population dynamics of soil pathogens with 8 papers, III genetical aspects of pathogenic and saprophytic behavior in root-infecting fungi with 5 papers, IV soil moisture and aeration on fungal activity with root diseases with 3 papers, V effect of root exudates on root infection with 10 papers, VI & VII root diseases of forest crops and tropical plantation crops with 15 papers, and VIII crop growth responses to soil fumigation with 7 papers.

The writing is concise, the reading is smooth, the printing is clean. Each paper presents its own bibliography; there is a general index.

This valuable book has much of interest to the economic botanist, the mycologist, the nematologist, the plant pathologist and the biology student.

"SYMPOSIUM ON MAJOR EVOLUTIONARY EVENTS AND THE GEOLOGICAL RECORD OF PLANTS" arranged by H. P. Banks for the International Botanical Congress, Seattle, Washington, 1969, pp. 317-454, illus., Special issue — BIOLOGICAL REVIEWS of the Cambridge Philosophical Society, Vol. 45, No. 3, Cambridge University Press, London N.W. 1 & New York, N. Y. 10022. 1970. \$8.00.

There are important, valuable papers on: precambrian micro-organisms and evolutionary events prior to the origin of vascular plants, the rise of the first land plants, the appearance of gymnospermous structure, heterospory and the origin of the seed habit, and palynological evidence on early differentiation of angiosperms. Prof. Banks gives a short introduction and an excellent summary in succinct outline of the main highlights in the record of plants on earth, followed by a time scale.

"MICROBES AND BIOLOGICAL PRODUCTIVITY" edited by D. E. Hughes & A. H. Rose, x & 378 pp., illus., Cambridge University Press, Cambridge, England & New York, N. Y. 10022. 1971. \$16.00.

This fine book consists of a preface and 15 papers presented in April 1971 to the 21st Symposium of the Society of General Microbiology at University College, London. Even with such prompt printing there is a general index. Each paper carries its own bibliography and together covers virtually all of the literature in the field, even the most recent.

The following topics are effectively discussed: quantitative and qualitative productivity, hydrocarbons as a possible future source of single-cell protein, algae and lithotrophic bacteria as food sources perhaps cultured on a "lawn" of filaments covered by a thin medium film for ruminants if not for people, microbial overproduction of food additives for flavor and preservation, microbial disease and biological control of plant and animal productivity, microbial activity in soils (especially around roots) and in N_2 fixation, and microbial production in polar regions, in oceans and in aquatic environments.

"INTRODUCTION TO FUNGI" by John Webster, viii & 424 pp., illus., Cambridge University Press, Cambridge, England & New York, N. Y. 10022. 1970. \$10.50.

This is an excellent new text usable as the main guide in any temperate climate area and as a reference book in any other climate. It is arranged systematically à la Ainsworth (1966) and stresses field observations, morphology and recent research yielded in the fields of physiology, ecology, genetics, cytology and ultrastructures, and pathology. It is copiously illustrated with excellent drawings (many from electron microscope reconstructions) and with good photographs (but some printed too darkly). The text is written clearly and most concisely. The bibliography is rich. The price is really reasonable.

"THE NATURAL PHILOSOPHY OF PLANT FORM" by Agnes Arber, xiv & 247 pp., illus., Facsimile reprint of 1950 edition, Hafner Publishing Company, Darien, Connecticut 06820 & New York, N. Y. 10022. 1970. \$9.95.

Muriel Arber, daughter of the author and the one to whom the book was originally dedicated, has added to this issue an accumulated list of errata and a second preface.

In this book, long out of print, the author has "made a tentative and provisional attempt to review the relations of parts in the flowering plants in the light of those more universal, and also more stringent, modes of thought, which are characteristic of philosophy rather than biology." The eleven chapters cover: the meaning and content of plant morphology from the schools of Aristotle, Albertus Magnus, Andrea Cesalpino, Joachim Jung, Goethe, and de Candolle through the author's concept of organiza-

tion type with special emphasis on the partial-shoot theory of the leaf.

This work is thoughtfully developed, well documented, classical and of historical value. I wonder how many copies will sell today?

"FLORA NEOTROPICA, MONOGRAPH No. 7, BRUNELLIACEAE" by José Cuatrecasas, 189 pp., illus., Hafner Publishing Co., Darien, Connecticut 06820 & New York, N. Y. 10022. 1970.

This is a complete taxonomic revision of 51 species of this family by the capable botanist-author who has been studying the group for many years especially in the Andean forests of Colombia and from world-wide herbarium collections. The single-genus family shows by anatomical data its affinity with the Rosales. The evolutionary discussions are very interesting. The drawings and photos are excellent. Carefully constructed keys are given.

Dr. Eyde contributed the chapter on anatomy and Dr. Marticorena the one on palynology.

"FLORA NEOTROPICA, MONOGRAPH Nos. 3, 4, 5, OMPHALINAE, PHAEOCOLLYBIA & STROBILOMYCETACEAE" (all Basidiomycetes) by Rolf Singer, 84, 13 & 35 pp., illus., Hafner Publishing Co., Darien, Connecticut 06820 & New York, N. Y. 10022. 1970. \$11.95.

These are detailed taxonomic studies of the subtribe, genus and family of the basidiomycetes that have occupied the author's attention for many years in both wide range field and herbarium studies. This work is highly valuable scientifically, but its price is inexcusably high for a paper-back issue of less than 150 pages.

A nice feature of the publication is the inclusion on the last page of a photograph and brief résumé of the author.

"BRISTLEcone PINE IN THE WHITE MOUNTAINS OF CALIFORNIA: GROWTH AND RING-WIDTH CHARACTERISTICS" by Harold C. Fritts, viii & 44 pp., illus., University of Arizona Press, Tucson, Arizona 85700. 1969. \$4.50.

This is Number 4 of the Papers of the Laboratory of Tree-Ring Research. The Pinus aristata Engelm. (misspelled in the preface) population on the dry upper slopes of these mountains in east-central California has some individuals whose age exceeds 4,000 years and whose green needles may be retained by branches for periods up to 30 years!

"The various tree-ring chronologies in all stands of the White Mountains are highly correlated with each other, especially in years of minimum growth. The statistical characteristics of tree-ring chronologies are a function of environmental modifications caused primarily by topographic variation, secondly by altitude difference, and thirdly by substrate conditions of each site. Ring-

width chronologies from the trees on exposed, low elevation, and rocky dolomitic sites are most variable.....and contain the most information about variations in climate....If the chronologies are developed from climatically 'sensitive' arid-site trees and appropriately dated, they can provide an accurate, extremely long and reliable record of moisture and temperature as it has varied in the past."

A carefully executed, well documented, interesting study!

"THE GROWING TREE" by B. F. Wilson, iv & 152 pp., illus., University of Massachusetts Press, Amherst, Massachusetts 01002. 1970. \$6.50.

"This book is intended for people, from the intelligent owner or observer of trees to the professional student of trees, who are interested in the basic processes of tree growth,...the culmination of more than ten years' work with growing trees". It discusses the general aspects of the growth process, form and elongation and dormancy of branches and roots, apical dominance and lateral formation and its orientation, the process and regulation of cambial activity, distribution of photosynthate and thickening problems, and finally the nutritive, correlative and competitive interactions of branches, roots and cambium to produce the growth of the whole tree.

This is a very neat, attractive, excellent piece of botany, writing and printing. It is provided with several flow charts, model diagrams and an interestingly annotated bibliography.

"GENETIC RESOURCES IN PLANTS — Their Exploration and Conservation" edited by O. H. Frankel & E. Bennett, xci & 554 pp., illus., F. A. Davis Co., Philadelphia, Pennsylvania 19103. 1970. \$17.50.

This is the eleventh of 15 already published International Biological Programme Handbooks planned primarily so that participating biologists will be guided in both their studies and their writings with common philosophies, goals, techniques and means of interpretation, and so that these recorded results, etc., "will be useful all over the world to biologists [on all levels — student, interested reader, instructors, researchers —] for many years to come". The book indicates safely that all are excellent and highly valuable in this whole series.

The importance of this work is not by any means exaggerated in this excerpt from the foreword: "the loss or destruction of the world's genetic resources by short-sighted or ill-directed planning is something so wasteful that its consequences can be disastrous both for world food production and for man himself." There are a preface, 45 papers, an appendix describing the work of Vavilov All-Union Institute of Plant Industry in Leningrad, a full name index and a skimpy subject index. The papers deal with biological background, tactics of exploration and collection with examples, evaluation and utilization, documentation and re-

trieval, and conservation of gene resources in seeds, pollen and asexual parts vested in a United Nations agency.

"MAN'S IMPACT ON THE GLOBAL ENVIRONMENT: Assessment and Recommendations for Action" edited by Carroll L. Wilson & William H. Matthews, xxi & 319 pp., illus., Massachusetts Institute of Technology Press, Cambridge, Massachusetts 02142 & London, England. 1970. \$2.95 paper-back; hard cover also available.

Preparatory to the 1972 United Nations Conference on the Human Environment, the Steering Committee, whose director and assistant director are the editors from the sponsoring M.I.T., planned a Study of Critical Environmental Problems (SCEP) for July 1970 at Williams College, Williamstown, Massachusetts. The month-long conference of several scientists and professionals will be recorded soon in detailed bound volumes and is presented in this report as a distillation of the major findings with recommendations and as résumés of the work groups on: climatic effects, ecological effects, monitoring, implications of change, industrial pollutants, domestic and agricultural wastes, and energy products.

Careful reading will achieve the major objective of SCEP which is desperately needed "to raise the level of informed public and scientific discussion and action on global environmental problems.....Most corrective action will probably have to be taken at the national, regional, and local levels. In research and monitoring programs, however, the potential for international cooperation is high."

The valuable papers indicate what is known and what is needed to be known, and they are documented with bibliography and covered in a general index.

"PATHOGENIC ROOT-INFECTING FUNGI" by S. D. Garrett, xi & 294 pp., illus., Cambridge University Press, Cambridge, England & New York, N. Y. 10022. 1970. \$12.50.

Rather than a new edition of the author's fine "Biology of Root-infecting Fungi" of 1956, this is an excellent whole new text about these organisms that constitute a substantial and omnipresent threat to all of our crop plants. Obviously, it will be needed by student, teaching and professional mycologists and plant pathologists, but it has a wider appeal for its "world is that of the living soil, which is the mother of all terrestrial plant life and therefore of direct concern to every human being and of interest to every biologist."

After an interesting introduction, the book treats unspecialized parasites in seedlings and older plants, then specialized ones in vascular wilts and ectotrophs, saprophytic colonization of substrates and host tissues, dormancy, and root disease control.

There are a good bibliography and an index, as well as relatively few excellent illustrations.

PARMELIA PERMACULATA, A NEW LICHEN FROM ALABAMA AND MEXICO

Mason E. Hale, Jr.

Smithsonian Institution, Washington, D.C. 20560

In my monograph of Parmelia subgenus Amphigymnia (Hale, 1965) I identified a series of specimens from Alabama and Mexico as P. reparata Stirton, a species first described from Australia. The identifications were tentative since the type was in poor condition. Now that I have recently seen other specimens from Australia, I am convinced that the American material is different and represents a new species since it has a broad zone free of rhizines along the margin below, whereas P. reparata consistently has dense rhizines to the margin and may actually be related to the widespread P. cetrata Ach.

PARMELIA PERMACULATA Hale, sp. nov.

Thallus laxe adnatus, expansus, coriaceus, usque ad 20 cm diametro, albocinereus, lobis rotundatis, usque ad 1.5 cm latis, margine ciliatis, ciliis 1.2-2.5 mm longis, superne planus, nitidus, valde albomaculatus, aetate rimosus, sorediis isidiisque destitutis, subtus niger, rhizinosus centrum versus, margine nudus, castaneus. Apothecia numerosa, usque ad 20 cm diametro, amphithecio rugoso, albomaculato, disco perforato, sporis 6-7X13-16 μ .

Holotype: On deciduous trees, open pasture, 9 km east Jalapa along hwy. 140, Veracruz, Mexico, M. E. Hale 19406, 13 March 1960 (US; isotypes in S, TNS, UPS).

Distribution: Alabama, Mexico (Veracruz, Chiapas, Nayarit). For specimens examined see those listed under P. reparata in Hale (1965), p. 338.

This conspicuous Amphigymnia species (see photograph, Fig. 39 in Hale, 1965) is most common in Veracruz at an elevation of 1000-1400 m. The nearest relative is fatiscient-sorediate P. corallifera Hale, a Mexican endemic. Both species contain atranorin and salazinic acid.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXVII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Harv., Gen. S. Afr. Pl., ed. 2, 411. 1868; Nakai, Bull. Géogr. Bot. 21: 139—140. 1911; Harshberger, Veg. N. J. Pine Barrens, pr. 1, 5, 121, 122, 139, 145, 146, 148, 149, 182, 184, 190, 191, 200, 215, 253, 307, & 324. 1916; Hooper, Gard. Bull. Straits Settl. 6: 59. 1929; R. S. Lamotte, Geol. Soc. Am. Mem. 51: [Cat. Cenoz. Pl. N. Am.] 157 & 369. 1952; Anon., Bull. Torrey Bot. Club Index Vols. 1—75, p. 71. 1955; Burkill, Dict. Econ. Prod. Malay Penins. 1: 953. 1966; J. A. Steyer., Act. Bot. Venez. 1 (3/4): 12, 15, 19, 22, 40, 41, 47, 50, 69, 72, 78, 87, 89, 91, 94, 98, 122, 135, 148, 155, 181, 195, 208, 222—223, 238, & 246—247. 1966; Lasser, Act. Bot. Venez. 4: 35. 1969; Van der Schijff, Check List Vasc. Pl. Kruger Natl. Park 20 & 36. 1969; Harshberger, Veg. N. J. Pine Barrens, pr. 2, 5, 121, 122, 139, 145, 146, 148, 149, 182, 184, 190, 191, 200, 215, 253, 307, & 324. 1970; Domville & Dunbar, John Burroughs Nat. Hist. Soc. Bull. 8: 32. 1970; J. Muller, Biol. Rev. 45: 424. 1970; Moldenke, Phytologia 21: 267—278. 1971; Koyama in E. H. Walker, Journ. Jap. Bot. 46: 67. 1971.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional bibliography: Moldenke, Phytologia 20: 340, 422, & 423. 1970.

Irwin and his associates describe this plant as a delicate herb to 7 cm. tall, with white flower-heads, and found it growing in wet crevices on a cliff-face in an area of cerrado and low forests among sandstone outcrops in summit gray sandy soil, at an altitude of 1200 meters, flowering in March.

Additional citations: BRAZIL: Minas Gerais: Irwin, Fonsêca, Souza, Reis dos Santos, & Ramos 27099 (Rf).

CARPTOTEPALA Moldenke

Additional bibliography: J. A. Steyer., Act. Bot. Venez. 1 (3/4): 181. 1966; Moldenke, Phytologia 21: 268. 1971.

CARPTOTEPALA JENMANI (Gleason) Moldenke

Additional bibliography: J. A. Steyer., Act. Bot. Venez. 1 (3/4): 181. 1966; Moldenke, Phytologia 21: 268. 1971.

Additional citations: VENEZUELA: Bolívar: Hertel & Oberwinkler 15302 (Mu).

ERIOCAULON Gron.

Additional & emended bibliography: Harv., Gen. S. Afr. Pl., ed. 2, 411. 1868; Nakai, Bull. Géogr. Bot. 21: 139—140. 1911; Harshberger, Veg. N. J. Pine Barrens, pr. 1, 5, 121, 122, 139, 145, 146, 148, 149, 190, 191, 200, 215, 253, 307, & 324. 1916; Hooper,

Gard. Bull. Straits Settl. 6: 59. 1929; R. S. Lamotte, Geol. Soc. Am. Mem. 51: [Cat. Cenoz. Pl. N. Am.] 157 & 369. 1952; Burkill, Dict. Econ. Prod. Malay Penins. 1: 953. 1966; J. A. Steyerma., Act. Bot. Venez. 1 (3/4): 15, 19, & 195. 1966; Harshberger, Veg. N. J. Pine Barrens, pr. 2, 5, 121, 122, 139, 145, 146, 148, 149, 190, 191, 200, 215, 253, 307, & 324. 1970; Domville & Dunbar, John Burroughs Nat. Hist. Soc. Bull. 8: 32. 1970; Moldenke, Phytologia 21: 268—273. 1971; Koyama in E. H. Walker, Journ. Jap. Bot. 46: 67. 1971.

ERIOCAULON ABYSSINICUM Hochst.

Additional bibliography: Van der Schijff, Check List Vasc. Pl. Kruger Natl. Park 36. 1969; Moldenke, Phytologia 20: 6. 1970; Moldenke, Biol. Abstr. 51: 11903. 1970.

Van der Schijff (1969) found this plant growing in moist places and cites Van der Schijff 2844.

ERIOCAULON CINEREUM R. Br.

Additional bibliography: Moldenke, Phytologia 21: 271. 1971.

Cook & Gut found this plant growing in paddy-fields and "very common on banks of very old large tank with permanent water, along with Glossostigma sp., the leaves submerged, flowering as it becomes exposed to air", fruiting in October and November.

Additional citations: INDIA: Kerala: Cook & Gut 221 (Ac). Rajasthan: Cook & Gut 61 (Rf).

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Harshberger, Veg. N. J. Pine Barrens, pr. 1, 139, 149, 191, & 200 (1916) and pr. 2, 139, 149, 191, & 200. 1970; Moldenke, Phytologia 21: 272. 1971.

Harshberger (1916) reports that in New Jersey this plant flowers in the "second half of May and June".

ERIOCAULON DECANGULARE L.

Additional bibliography: Harshberger, Veg. N. J. Pine Barrens, pr. 1, 121, 122, 139, 148, 149, 190, 191, 200, & 215 (1916) and pr. 2, 121, 122, 139, 148, 149, 190, 191, 200, & 215. 1970; Moldenke, Phytologia 21: 270 & 272. 1971.

Harshberger (1916) reports that in New Jersey the species grows in cedar swamps in small circular pools of water with Castalia odorata, Rhynchospora alba, Sarracenia purpurea, etc., and flowers and fruits from July 15 to October 5.

ERIOCAULON DICTYOPHYLLUM Körn.

Additional bibliography: Moldenke, Phytologia 20: 405. 1970.

Irwin and his associates state that the inflorescences of this plant attain a height of 30 cm. and that the flower-heads are gray when fresh. They found it growing on a periodically flooded river island.

Additional citations: BRAZIL: Mato Grosso: Irwin, Souza, Grear, & Reis dos Santos 16797 (Ac).

ERIOCAULON FENESTRATUM Bojer

Additional bibliography: Moldenke, *Phytologia* 20: 407. 1970.

Bogner collected this species at 1200 meters altitude, flowering and fruiting in November.

Additional citations: MADAGASCAR: Bogner 349 (Mu).

ERIOCAULON GIBBOSUM Körn.

Additional bibliography: Moldenke, *Phytologia* 21: 273. 1971.

Irwin and his associates describe this plant as producing inflorescences to 15 cm. tall, the flower-heads grayish, and found it growing in a wet campo between gallery forest and cerrado, at 550 meters altitude, flowering and fruiting in June.

Additional citations: BRAZIL: Mato Grosso: Irwin, Grear, Souza, & Reis dos Santos 16417 (N).

ERIOCAULON HETEROLEPIS Steud.

Additional bibliography: Moldenke, *Phytologia* 20: 410. 1970.

The Stocks, Law, &c. s.n., cited below, was originally cited by me as E. diana var. longibracteatum Fyson, apparently in error. The collection was distributed in herbaria under the names E. rouxianum Steud., E. minimum Lam., and E. xeranthemum Mart., but Schultes notes on the label "Certe non est E. xeranthemum Mart."

Additional citations: INDIA: Kerala: Stocks, Law, &c. s.n. [Malabar, Concan, &c.] (Mu-262).

ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Moldenke, *Phytologia* 21: 273. 1971.

This plant has been collected at altitudes of 500-800 meters.

Additional citations: VENEZUELA: Bolívar: Hertel & Oberwinkler 15349 (Mu).

ERIOCAULON HUMILE Moldenke

Additional bibliography: Moldenke, *Phytologia* 20: 411. 1970.

Recent collectors have found this plant growing in the more or less permanently moist zone at the base of a waterfall, flowering in November. Material has been misidentified and distributed in herbaria as E. minutum Hook.

Additional citations: INDIA: Mysore: Cook & Gut 187 (Ac).

ERIOCAULON LANCEOLATUM Miq.

Additional bibliography: Moldenke, *Phytologia* 20: 13. 1970.

Cook & Gut found this species growing on wet rocks, flowering and fruiting in November.

Additional citations: INDIA: Kerala: Cook & Gut 232 (Z).

ERIOCAULON LEPTOPHYLLUM Kunth

Additional bibliography: Moldenke, *Phytologia* 20: 13. 1970.

Irwin and his associates describe this plant as producing inflorescences to 15 cm. tall and found it growing in running water on red clay on a wet campo, at 1000 m. altitude, flowering in January.

Additional citations: BRAZIL: Minas Gerais: Irwin, Onishi, Fonsêca, Souza, Reis dos Santos, & Ramos 25641 (Rf).

ERIOCAULON LUTCHUENSE Koidz.

This taxon now is known as E. miquelianum var. lutchuense (Koidz.) Koyama.

ERIOCAULON LUZULAEFOLIUM Mart.

Additional synonymy: Eriocaulon luzulaefolium Mart., in herb.

Additional bibliography: Moldenke, *Phytologia* 21: 275. 1971.

The Cook & Gut 171, distributed as E. luzulaefolium, is actually E. quinquangulare L.

ERIOCAULON MINUTUM Hook. f.

Additional bibliography: Moldenke, *Phytologia* 19: 347 (1970) and 20: 28. 1970.

The Cook & Gut 187, distributed as E. minutum, is actually E. humile Moldenke.

ERIOCAULON MIQUELIANUM Körn.

Additional bibliography: Moldenke, *Phytologia* 21: 278. 1971; Koyama in E. H. Walker, *Journ. Jap. Bot.* 46: 67. 1971.

ERIOCAULON MIQUELIANUM var. LUTCHUENSE (Koidz.) Koyama

Additional synonymy: Eriocaulon lutchuense Koidz., *Bot. Mag. Tokyo* 28: 171. 1914.

Additional bibliography: Moldenke, *Phytologia* 21: 275 & 429. 1971; Koyama in E. H. Walker, *Journ. Jap. Bot.* 46: 67. 1971.

ERIOCAULON MODESTUM Kunth

Additional bibliography: *Malme, Bih. Svensk. Vet. Akad. Handl.* 27 (3), no. 11: 32—33. 1901; Moldenke, *Phytologia* 20: 15. 1970.

ERIOCAULON MODESTUM var. BREVIFOLIUM Moldenke

Bibliography: Moldenke, *Phytologia* 21: 417. 1971.

Irwin and his associates have found this plant growing locally common in wet places in cerrado or locally frequent on wet campos on rocky hillsides, at altitudes of 1100 to 1250 m., flowering in January and March. They describe the plant as a rosette herb, the "solitary" inflorescences to 40 cm. tall, light-gray in color.

Citations: BRAZIL: Distrito Federal: Irwin, Souza, & Reis dos Santos 11677 (Rf). Goiás: Irwin, Grear, Souza, & Reis dos Santos 13498 (Ac), 13781 (Z—type).

ERIOCAULON MOLINAE L. O. Williams

Additional bibliography: Hocking, *Excerpt. Bot. A.* 13: 510. 1968; Moldenke, *Phytologia* 19: 81 & 101. 1969.

ERIOCAULON MONOCOCCOS Nakai

Additional bibliography: Moldenke, *Phytologia* 3: 144. 1949; Koy-

ama in Ohwi, Fl. Jap. 269. 1965; Moldenke, Phytologia 19: 81. 1969.

ERIOCAULON MONTANUM Van Royen

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 409. 1970; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON MUTATUM N. E. Br.

Additional & emended bibliography: Moldenke, Phytologia 3: 143. 1949; H. Hess, Bericht. Schweiz. Bot. Ges. 67: 88--90. 1957; Moldenke, Phytologia 19: 82 (1969) and 19: 457 & 458. 1970.

ERIOCAULON NAKASIMANUM Satake

Synonymy: Eriocaulon atrum var. nakasimanum (Satake) Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 321--322 (1929) and 20: 247 & 248. 1970.

Koyama (1965) records the vernacular "tsukushi-kuro-inu-no-hige" and says that the taxon differs from E. atrum Nakai only in "the glabrous receptacle, not blackish involucre, and quite glabrous petals".

ERIOCAULON NANELLUM Ohwi

Synonymy: Eriocaulon nanellum var. nanellum Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 270. 1965; Moldenke, Phytologia 19: 347--348. 1970.

Koyama (1965) records the vernacular variant "miyama-hina-hoshikusa" and affirms that the species is known only from the high mountains of the northern districts of Honshu island. The E. nanellum var. nosoriense (Ohwi) Ohwi & Koyama is discussed by me under E. nosoriense Ohwi, which see.

ERIOCAULON NANELLUM var. ALBESCENS Satake

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 323. 1969.

Koyama (1965) records the vernacular variant "shirobana-miyama-hina-hoshi-kusa" and tells us that the plant differs from the typical form of the species in having the flower "Heads greenish, not blackish; pistillate calyces also greenish".

ERIOCAULON NANELLUM var. FILAMENTOSUM (Satake) Satake

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 323--324. 1969.

Koyama (1965) records the vernacular variant "ito-hoshi-kusa", says that the taxon is found only in the northern districts of Honshu island, and that it differs from the typical form of the species

in having the "Staminate calyces deeply 3-fid, otherwise with the characters of the typical phase."

ERIOCAULON NEESIANUM Körn.

Additional & emended bibliography: Körn., *Linnaea* 27: 585 & 628—630. 1856; Körn. in Mart., *Fl. Bras.* 3 (1): 285. 1863; Moldenke, *Phytologia* 19: 348 & 464. 1970.

ERIOCAULON NEGLECTUM Ruhl.

Additional bibliography: Moldenke, *Phytologia* 20: 15. 1970.

Additional citations: BRAZIL: Mato Grosso: Hatschbach & Guimarães 21848 (N).

ERIOCAULON NEO-CALEDONICUM Schlecht.

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 172, 173, & 189. 1969; Moldenke, *Phytologia* 19: 409. 1970.

Additional citations: NEW CALEDONIA: Hürlimann 1498 (N).

ERIOCAULON NIGERICUM Meikle

Additional & emended bibliography: Meikle & Baldwin, *Am. Journ. Bot.* 39: 44—46 & 50, fig. 1—8. 1952; Moldenke, *Phytologia* 18: 349. 1969.

ERIOCAULON NIGRUM H. Lecomte

Additional bibliography: Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 184 & 186. 1969; Moldenke, *Phytologia* 19: 83 (1969) and 19: 453. 1970.

ERIOCAULON NILAGIRENSE Steud.

Additional bibliography: Moldenke, *Phytologia* 20: 15—16. 1970.

Koyama found this species to be locally abundant in swampy depressions in wet black Patana grasslands along streams with grasses at 7200 feet altitude and along the wet edges of narrow streams mixed with Fimbristylis monticola and Carex arnottiana. Kingdon-Ward tells us that it is the "largest species of the genus locally in bogs in the forests where the Adiantum fern grows" — the fern being represented by Kingdon-Ward 18663. He states that the pipewort plants are 18—20 inches tall. Recent collectors have found the species in flower and fruit in March, May, and July.

Additional citations: INDIA: Khasi States: Kingdon-Ward 18665 (N). CEYLON: Koyama 13521 (N), 13642 (N).

ERIOCAULON NIPPONICUM Maxim.

Additional bibliography: Moldenke, *Phytologia* 2: 375 & 376 (1947), 2: 494 (1948), and 3: 143 & 144. 1949; Koyama in Ohwi, *Fl. Jap.* 265 & 266. 1965; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 186 & 191. 1969; Moldenke, *Phytologia* 19: 334 & 348. 1970.

Koyama (1965) records the vernacular variant "ito-imu-no-hige" and states that the plant is "quite common" in wet places in the lowlands of Hokkaido, Honshu, Shikoku, Kyushu, Korea, and China.

Murata found it growing at 300 meters altitude.

Additional citations: JAPAN: Honshu: Murata 15306 (W-2409658).

ERIOCAULON NOSORIENSE Ohwi

Synonymy: Eriocaulon nanellum var. nosoriense (Ohwi) Ohwi & Koyama ex Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 357 & 363. 1969.

Koyama (1965) records the vernacular variant "nosori-hoshi-kusa" for this plant and says that the taxon differs from E. nanellum Ohwi only in having the "Pistillate flowers with irregular deeply 3-fid calyces ciliate on margin, the petals sparsely pilose inside".

ERIOCAULON NOVOGUINEENSE Van Royen

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 349. 1970; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON NUDICUSPE Maxim.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 268. 1965; Moldenke, Phytologia 19: 349. 1970.

Koyama (1965) records the vernacular names "konpeitō-sō" and "shiratama-hoshi-kusa" for this plant and describes it as being "locally abundant" in wet places around springs in low hills on Honshu island.

ERIOCAULON OFFICINALE Körn.

Emended synonymy: Eriocaulon officinalis Körn. in Mart., Fl. Bras. 3 (1): 508, sphalm. 1863.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 288, 475, 480, & 508. 1863; Moldenke, Phytologia 19: 349. 1970.

ERIOCAULON OLIVACEUM Moldenke

Additional & emended bibliography: Moldenke, Phytologia 1: 320, 351, & 355. 1939; Moldenke, Alph. List Cit. 1: 186. 1946; Moldenke, Phytologia 18: 361. 1969.

ERIOCAULON OMURANUM Koyama

Bibliography: Koyama in Ohwi, Fl. Jap. 266 & 267. 1965.

Koyama (1965) reports the vernacular name "shinano-inu-no-hige" for this species and avers that the plant is known thus far only from the type locality, Lake Shirakaba, in Shinano Province, Honshu, Japan.

ERIOCAULON OREADUM Van Royen

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 67 & 84-85. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

[to be continued]

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 21

July, 1971

No. 7

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, \$1; per volume, \$7.50, in advance,
or \$8, at close of volume

AUG 2 1971

NEW YORK

NOMENCLATURAL NOTES ON THE ORCHIDACEAE - IV

Robert L. Dressler and Glenn E. Pollard

The authors have had a special interest in the genus Encyclia for several years, and we hope to publish an illustrated revision of the Mexican species in the near future. We herewith validate the necessary new combinations and new taxa, to make these names available for use in anatomical and other studies which may antedate the revision. In the present note we will give synonyms other than the basionym only in cases of special interest.

The distinctions between Encyclia and Epidendrum have been discussed by Dressler (Brittonia 13: 253-266. 1961). We have treated the two major groups within Encyclia as sections, but we will now treat them as subgenera to facilitate the delineation of distinctive subgroups within each. These subgenera are compared in the accompanying table. While these groups differ in several tendencies, none of these gives a really sharp separation. The shape of the column is the most constant feature and it is easily seen, but there are a few species which do not conform well, even in this feature. Thus, we feel that these two groups are best classified as subgenera of a single genus.

1. ENCYCLIA subgenus OSMOPHYTUM (Lindley) comb. nov.
- Epidendrum subgenus Osmophytum Lindley, Hook.
Journ. Bot. 3: 81. 1841. Type: Epidendrum fragrans Sw.

Lindley first named this group as a section, in 1839 (Bot. Reg. 25: misc. p. 85), but in other places he used "section," "subgenus" and "division" quite interchangeably. We cannot now explain (or justify) Dressler's modification of Osmophytum to "Osmophyta" (Brittonia 13: 261. 1961).

- 1a. ENCYCLIA section OSMOPHYTUM

This section includes most members of the subgenus and is quite diverse in some features, but all the extremes are connected by intermediate species.

- 1b. ENCYCLIA section HORMIDIUM (Lindley) comb. et stat. nov. - Epidendrum subgenus Hormidium Lindley, Hook. Journ. Bot. 3: 81. 1841.
Type: Epidendrum uniflorum Lindley (= Encyclia triptera).

This small group includes E. grammatoglossa, E. rhynchophora, E. triptera and possibly one or two

Subgenus Encyclia

Mid-tooth of column short, usually broadly deltoid, separated from the lateral teeth by broad, shallow sinuses, closely appressed to the anther, not covered by a fleshy, knob-like appendage

Capsule not sharply 3-angled or 3-winged

Flower and plant tissues without large crystals

Column often winged

Callus usually 2 fleshy ridges with an elliptic or boat-shaped depression in the middle

Inflorescence usually without a prominent spathe

Pseudobulbs usually ovoid or conic-ovoid, rarely flattened

Leaves thick and leathery

Subgenus Osmophytum

Mid-tooth of column ("ligule") narrowly deltoid, ligulate or subflabellate, not closely appressed to the anther, usually more or less covered by a fleshy, knob-like appendage, which is obtuse or truncate and separated from the lateral teeth by deep and usually acute sinuses

Capsule usually sharply 3-angled or 3-winged

Flower and plant tissues usually filled with large crystals

Column never winged

Callus usually a thickened pad

Inflorescence often with a prominent spathe

Pseudobulbs often somewhat flattened

Leaves thinner

A comparison of the subgenera Encyclia and Osmophytum

other species of South America; it may be distinguished by the very long apical appendage ("mid-tooth") of the column, the broad, rounded lateral lobes of the lip and the small, acute or acuminate mid-lobe. Hormidium has been treated as a distinct genus at times, but never very clearly delimited. Until very recently, at least, this name was used only for E. triptera and its several synonyms and for several species of true Epidendrum which have no close relationship with E. triptera.

1c. ENCYCLIA section EUCHILE, sect. nov. - Caulis pseudobulbosus, ovoideus; labellum magnum, subintegrum; columna clavata, apice trilobulata. Type: Epidendrum mariae Ames.

This section includes only the type and the closely allied E. citrina. These species agree with the other species of subgenus Osmophytum in the fleshy appendage ("mid-tooth") at the apex of the column, but are otherwise somewhat anomalous in all their features.

2. ENCYCLIA subgenus ENCYCLIA

Type: Encyclia viridiflora Hooker

2a. ENCYCLIA section ENCYCLIA

This section corresponds to the genus Encyclia as it has been used by many authors. Species such as E. bractescens, E. kienastii and especially E. microbulbon show strong relationships with section Leptophyllum.

2b. ENCYCLIA section BRACHYCOLUMNA (L. Wms.) comb.

nov. - Epidendrum section Brachycolumna L. Wms., Amer. Orchid Soc. Bull. 10: 309. 1942.

Type: Epidendrum brachycolumna L. Wms.

This section includes only the type, an unusual and probably primitive species with eight rather than four pollinia. It is most closely related to the members of the following section.

2c. ENCYCLIA section LEPTOPHYLLUM, sect. nov. -

Caulis pseudobulbosus, subsphaericus; folia lineares; labellum integrum, subadnatum, papillosum vel striatum; columna brevis, lobuli laterales longiores, aliiiformes. Type: Epidendrum tenuissimum Ames, Hubb. & Schweinf.

This rather uniform little group includes E. cyanocolumna, E. distantiflora, E. luteorosea, E. subulatifolia and E. tenuissima. Aside from their very narrow leaves, most of them are vegetatively like the members of section Encyclia in miniature. The column, too, resembles that of section Encyclia, but the lateral teeth or lobes are large and somewhat wing-like (extended apically, not laterally as are the true column-wings in many species of section Encyclia).

2d. ENCYCLIA section DINEMA (Lindley) comb. et stat.

nov. - Dinema Lindley, Gen. & Sp. Orch. Pl.

111. 1831. Type: Epidendrum polybulbon Sw.

This section includes only the type species, which vegetatively resembles subgenus Osmophytum, but florally is most closely allied to sections Leptophyllum and Encyclia. This, as with the other sections here named, fits comfortably in our broader concept of Encyclia, but it would be a misfit in any more narrowly delineated genus (unless monotypic).

NEW COMBINATIONS IN ENCYCLIA

ENCYCLIA ADENOCARPON subsp. TRACHYCARPA (Lindley)
comb. et stat. nov. - Epidendrum trachycarpum
Lindley, Benth. Bot. Voyage Sulph. 172. 1846.

ENCYCLIA ALATA subsp. PARVIFLORA (Regel) comb. et
stat. nov. - Epidendrum alatum [var.] parviflorum
Regel, Ann. Sci. Nat. IV, 6: 374. 1856.
Epidendrum belizense of Withner, Orchid Digest 34:
51-54. 1970, not of Reichenbach

We have not seen material of the type collection,
but Regel's description agrees very well with this
otherwise unnamed subspecies.

ENCYCLIA ALATA subsp. VIRELLA, nom. et stat. nov.,
based on Epidendrum belizense Reichb. f., Linnaea
41: 78. 1876.

Epidendrum virens Lindley & Paxt., Paxton's Flower
Gard. 1: 152. 1850 [not E. virens Hoffm. 1842].

Epidendrum alatum [var.] viridiflorum Regel, Ann.
Sci. Nat. IV, 6: 374. 1856 [not Encyclia
viridiflora Hooker].

Epidendrum guatemalense of Withner, Orchid Digest
34: 51-54. 1970, not of Klotzsch.

We have based this subspecies on Epidendrum
belizense Reichb. f., because a type specimen is
known to exist, but we fear that the epithet belizense
would now be a source of confusion, because of its
recent use for the preceding subspecies.

ENCYCLIA BACULUS (Reichb. f.) comb. nov. - Epidendrum
Baculus Reichb. f., Bonplandia 4: 214. 1856.

Epidendrum pentotis Reichb. f., Linnaea 41: 81. 1876.

ENCYCLIA BICAMERATA (Reichb. f.) comb. nov. -
Epidendrum bicameratum Reichb. f., Gard. Chron.
1871: 1194.

ENCYCLIA BOOTHIANA subsp. FAVORIS (Reichb. f.) comb. et
stat. nov. - Epidendrum favoris Reichb. f., Gard.
Chron. n. s. 2: 98. 1874.

ENCYCLIA BRACHIATA (Rich. & Gal.) comb. nov. -
Epidendrum brachiatum Rich. & Gal., Ann. Sci. Nat.
III, 3: 20. 1845.

ENCYCLIA CHACAOENSIS (Reichb. f.) comb. nov. -
Epidendrum chacaoense Reichb. f., Bonplandia 2: 20.
1854.

ENCYCLIA CHONDYLOBULBON (Rich. & Gal.) comb. nov. -
Epidendrum chondylobulbon Rich. & Gal., Ann. Sci.
Nat. III, 3: 20. 1845.

ENCYCLIA DIOTA subsp. ATRORUBENS (Rolfe) comb. et stat.
nov. - Epidendrum atrorubens Rolfe, Kew Bull. 1896:
46.

- ENCYCLIA DISTANTIFLORA (Rich. & Gal.) comb. nov. -
Epidendrum distantiflorum Rich. & Gal., Ann. Sci.
 Nat. III, 3: 19. 1845.
- ENCYCLIA GLAUCA (Knowles & Westc.) comb. nov. -
Prosthechea glauca Knowles & Westc., Floral Cab.
 2: 111. 1838 - Epithecia glauca Knowles & Westc.,
 Floral Cab. 2: 167, t. 87. 1838 - Epidendrum
glaucum (Knowles & Westc.) Lindley, Bot. Reg. 26:
 misc. p. 29. 1840 [not E. glaucum Sw. 1788] -
Epidendrum glaucovirens Ames, Hubb. & Schweinf.,
 Bot. Mus. Leaf. 3: 70. 1935.
Epidendrum limbatum Lindley, Bot. Reg. 29: misc. p.
 69. 1843 - Encyclia limbata (Lindley) Dressler,
 Brittonia 13: 265. 1961.
- ENCYCLIA GUATEMALENSIS (Klotzsch) comb. nov. -
Epidendrum guatemalense Klotzsch, Allg. Garten-
 zeitung 20: 250. 1852.
Epidendrum dickinsonianum Withner, Orchid Digest 34:
 253. 1970.
- ENCYCLIA HASTATA (Lindley) comb. nov. - Epidendrum
hastatum Lindley, Hook. Journ. Bot. 3: 82. 1840.
- ENCYCLIA KIENASTII (Reichb. f.) comb. nov. -
Epidendrum kienastii Reichb. f., Gard. Chron. III,
 2: 126. 1887.
- ENCYCLIA LANCIFOLIA (Lindley) comb. nov. - Epidendrum
lancifolium Pavon ex Lindley, Gen. & Sp. Orch. Pl.
 98. 1831.
- ENCYCLIA LUTEOROSEA (Rich. & Gal.) comb. nov. -
Epidendrum luteo-roseum Rich. & Gal., Ann. Sci.
 Nat. III, 3: 19. 1845.
- ENCYCLIA NEUROSIA (Ames) comb. nov. - Epidendrum
neurosium Ames, Sched. Orch. 1: 17. 1922.
- ENCYCLIA X PERPLEXA (Ames, Hubb. & Schweinf.) comb. et
 stat. nov. - Epidendrum oncidoides var. perplexum
 Ames, Hubb. & Schweinf., Bot. Mus. Leaf. 3: 108.
 1935.
 This aptly named plant proves to be perfectly
 intermediate between E. bractescens and E. candollei.
 We are confident that it is a natural hybrid of these
 species.
- ENCYCLIA POLLARDIANA (Withner) comb. nov. - Epidendrum
pollardianum Withner, Orchid Digest 34: 117. 1970.
- ENCYCLIA X PROFUSA (Rolfe) comb. et stat. nov. -
Epidendrum profusum Rolfe, Bot. Mag. 140: t. 8551.
 1914.
 Study of a flower from the type shows this to be
 another natural hybrid: Encyclia ambigua X ceratistes.

ENCYCLIA TRIPTERA (Brongn.) comb. nov. - Coelogyne triptera Brongn., Dup. Voy. Coq. Phan. 201, t. 42. 1829.

Brieger and Hunt have shown that this epithet antedates Epidendrum pygmaeum Hooker (Taxon 18: 601. 1969). The epithet tripterum is preoccupied in Epidendrum.

ENCYCLIA VAGANS (Ames) comb. nov. - Epidendrum vagans Ames, Sched. Orch. 6: 76. 1923.

ENCYCLIA VARICOSA subsp. LEIOBULBON (Hooker) comb. et stat. nov. - Epidendrum leiobulbon Hooker, Hook. Journ. Bot. 3: 308, t. 10. 1841.

NEW TAXA

ENCYCLIA AENICTA, sp. nov.

Epidendrum pollardianum Withner, Orchid Digest 34: 117. 1970, as to photograph and most drawings, not as to type specimen.

E. pseudobulbis conicis 1-3 phyllis, foliis ellipticis vel ligulatis, sepalis oblanceolatis, petalis cuneato-spathulatis, labelli subliberi, trilobi, lobis lateralibus oblongis, apice recurvis, intermedio subrotundo mucronato, striato, columna aptera.

Holotype: Mexico; Nayarit, near Jalcocotán, Feb. 1947, flowered in cult. June 1952, E. Yale Dawson s. n. (US 2399076, isotype MO).

This species is closely related to E. diota and E. spatella (syn. E. meliosma), and thus a member of one of the most difficult complexes in the genus. In some areas it hybridizes extensively with E. spatella, but in others they coexist without any sign of intergradation. To make matters worse, the type of E. meliosma cannot now be found. If the specimen is ever located, we may find the customary interpretation of E. meliosma to be incorrect.

ENCYCLIA CRETACEA, sp. nov.

E. pseudobulbis ovoideis, 3 phyllis, foliis ellipticis, glaucis, racemo terminale, sepalis lanceolatis, petalis anguste ellipticis, labelli subliberi, trilobi lobis lateralibus oblongo-linearis, intermedio rhombiformi, striato, columna aptera.

Holotype: Mexico; Oaxaca, 2.8 km. from Tuxtepec highway at km. 21, east of highway on logging road; on oaks in pine-oak forest, 8,250 ft. elev.; 16 Jan. 1971, G. E. Pollard s. n. (US).

A member of section Osmophytum, this species resembles E. citrina in the glaucous, pendent plants, but the flowers are similar to those of E. concolor,

from which it differs in habit, in the form of the lip and in the wingless capsule.

ARTORIMA, gen. nov.

Caulis pseudobulbosus, remotus; folia breves; pedunculus paniculatus; labellum semiadnatum, lobi suborbiculari, callo uncinato retrorso ornatum; stigma rimiformis.

Type: Epidendrum erubescens Lindley

ARTORIMA ERUBESCENS (Lindley) comb. nov. - Epidendrum erubescens Lindley, Hook. Journ. Bot. 3: 87.
1840 - Encyclia erubescens (Lindley) Schltr., Die Orchideen 214. 1914.

Superficially, this beautiful species fits Encyclia rather than Epidendrum, but the floral details do not coincide with those of any known genus. The retrorse, hook-like callus is very unusual, as is the prominent, incurved mid-tooth of the column. The narrow slit-like stigma, with a wider chamber within, is quite unlike that of any related genus.

NOMENCLATURAL NOTES ON THE ORCHIDACEAE - V

Robert L. Dressler

The present paper includes miscellaneous new combinations, names and synonymies in American Orchidaceae.

BLETIA PURPURATA Rich. & Gal., Ann. Sci. Nat. III, 3: 23. 1845.

Crybe rosea Lindley, Nat. Syst. Bot. ed. 2, 446.

1836 - Bletia rosea (Lindley) Dressler, Taxon 13: 248. 1964, not B. rosea (Lindley) Reichb. f., 1862.

In checking on the combination Bletia rosea, I failed to note that my card file of Bletia names had been divided into two categories, and thus overlooked Reichenbach's earlier use of the name (for what is now considered a Schomburgkia). The epithet purpurata is uncomfortably like that of B. purpurea (Lam.) DC., but there seems to be no alternative to its use.

I here publish new combinations for the few Central American Encyclias which still lack valid names in Encyclia and for two South American members of the E. fragrans complex, which will be treated in greater detail in a separate paper.

ENCYCLIA AMANDA (Ames) comb. nov. - Epidendrum amandum Ames, Sched. Orch. 4: 36. 1923.

ENCYCLIA CHIMBORAZOENSIS (Schltr.) comb. nov. - Epidendrum chimborazoense Schltr., Repert. Sp. Nov. 14: 389. 1916.

ENCYCLIA FRAGRANS subsp. AEMULA (Lindley) comb. et stat. nov. - Epidendrum aemulum Lindley, Bot. Reg. 22: t. 1898. 1836 - Epidendrum fragrans var. aemulum (Lindley) Barb. Rodr., Gen. et Sp. Orch. Nov. 2: 136. 1881.

Epidendrum aemulum var. brevistriatum Reichb. f., Linnaea 41: 37. 1876 - Epidendrum fragrans var. brevistriatum (Reichb. f.) Cogn., Mart. Fl. Bras. 3(5): 85. 1898.

Most recent authors have cited the above synonym as "var. breviaristatum," which suggests that all have copied the same error.

ENCYCLIA LAMBDA (Linden & Reichb. f.) comb. nov. - Epidendrum lambda Linden & Reichb. f., Bonplandia 2: 281. 1854.

Epidendrum rueckerae Reichb. f., Hamb. Gartenz. 21: 385. 1865.

ENCYCLIA SPONDIADUM (Reichb. f.) comb. nov. -

Epidendrum Spondiadum Reichb. f., Bot. Zeit. 10: 731. 1852.

ENCYCLIA VENEZUELANA (Schltr.) comb. nov. -

Epidendrum venezuelanum Schltr., Repert. Sp. Nov. Beih. 6: 39. 1919.

ENCYCLIA VESPA (Vell.) comb. nov. - Epidendrum Vespa Vell., Fl. Flum. Ic. 9: t. 27. 1827.

Epidendrum crassilabium Poepp. & Endl., Nov. Gen. & Sp. Pl. 2: 1, t. 102. 1838 - Encyclia crassilabia (Poepp. & Endl.) Dressler, Brittonia 13: 264. 1961.

Epidendrum variegatum Hook., Bot. Mag. 59: t. 3151. 1832.

Epidendrum baculibulbum Schltr., Repert. Sp. Nov. Beih. 19: 116. 1923.

I give here only the synonyms most important for Central America. This species is nomenclaturally central in a bewildering complex which is most variable in the Andes. It seems best to use this name for the entire complex until (or unless) a thorough study of the complex is available.

EPIDENDRUM HAMATUM (Garay) comb. nov. - Stenoglossum hamatum Garay, Orquideologia 4: 72. 1969.

Garay suggests that Stenoglossum be accepted as a genus distinct from Epidendrum on the basis of four features (loc. cit. p. 70); these are:

1. non-resupinate flowers - This feature is frequent in Epidendrum, including section Spathium Lindley. Many species of section Spathium have an arching inflorescence, so that most flowers have the lip lowermost without any actual twisting of the ovary or pedicel (a sort of passive resupination). This is exactly the situation in Epidendrum [Stenoglossum] coryophorum. This feature clearly cannot be taken to distinguish Stenoglossum from Epidendrum.

2. transverse plate-like rostellum - The rostellum is transverse and plate-like in all species of Epidendrum. In most species of Epidendrum the transverse rostellum is nearly parallel with the axis of the column, while in E. coryophorum and E. hamatum it forms an angle of about 45° with the axis of the column, which may be the distinction intended by Garay. The structure of the rostellum is quite the same in E. coryophorum and E. hamatum as in the majority of Epidendrum species, and the angle varies somewhat within Epidendrum.

3. two, distinctly lobed stigmata - I believe that Garay has misinterpreted the structure of the stigma. The drawing which accompanies his paper (loc. cit. p. 74) shows the posterior stigmatic lobes from below and

behind, and thus cannot show whether or not the stigmatic surface is continuous in front of and between these lobes. My examination of herbarium specimens indicates that the stigmatic surface is by no means divided into separate stigmas, but is quite like that of Epidendrum tridactylum, except that the posterior lobes project forward (see Brittonia 19: 238. 1967).

4. ovoid or globose, but never compressed, pollinia - The pollinia of E. coryophorum are undoubtedly very thick, even if slightly compressed laterally. However, the pollinia of E. hamatum are distinctly compressed. In the type collection and in Barkley, Gutiérrez & Sierra 4, the dry pollinia are more strongly compressed than those of Epidendrum elegantissimum Lehm. & Kränzlin or E. brachyglossum Lindley, and compressed to about the same degree as those of E. cylindraceum Lindley and E. parvilabre Lindley (all species which resemble Stenoglossum in habit and other features). Thus, I must reaffirm my earlier conclusion that Stenoglossum should not be maintained as a distinct genus (Brittonia 19: 243. 1967).

HEXISEA BICORNIS (Lindley) comb. nov. - Hexadesmia bicornis Lindley, Bot. Reg. 30: misc. p. 41. 1841 - Scaphyglottis bicornis (Lindley) Garay, Bot. Mus. Learl. 21: 255. 1967.

Scaphyglottis ruberrima var. aurea Reichb. f., Linnaea 22: 856. 1849 - Tetragamestus aureus Reichb. f., Bonplandia 2: 22. 1854 - Scaphyglottis aurea (Reichb. f.) Foldats, Acta Biol. Venez. 2: 381. 1959 - Hexisea aurea (Reichb. f.) Dressler, Taxon 13: 246. 1964.

Scaphyglottis genychila Schltr., Repert. Sp. Nov. Beih. 7: 122. 1920.

Garay (loc. cit.) indicates that bicornis Lindley is an earlier epithet for this species, which I have assigned to Hexisea. As indicated in the previous paper (loc. cit.), the assignment is based primarily on the non-jointed lip and the close relationship to H. sigmoidea Ames & Schweinf. As indicated by Garay, the supposedly sigmoid form of the lip is, by itself, insufficient to delimit the genus.

In our work with American orchids, a few genera have consistently refused to "fit" in the tribes or subtribes to which they were assigned by Schlechter and subsequent authors. Two of these are so isolated in their relationships and so unusual in their characteristics as to demand the creation of separate subtribes, while the remaining genera are, together, sufficiently distinctive to suggest tribal status.

Tribe EPIDENDREAE subtribe CRYPTARRHENINAE, new subtribe - Folia conduplicata; pedunculi laterales, multiflori; columna brevis, clinandrio cucullato; pollinia 4, complanata; caudiculae 1 vel 2, stipitiformes.

Type: Cryptarrhena Lindley

It is not at all clear whether this monogeneric subtribe should be assigned to the Epidendreae or the Vandeae. The habit and the form of the pollinia suggest Vandeae, and the hyaline, stipe-like caudicles resemble those of Lockhartia and Centropetalum, which however, attach to true stipes. This subtribe may eventually be given tribal rank.

Tribe EPIDENDREAE subtribe MEIRACYLLIINAE, new subtribe - Caules monophylli; folia conduplicata, carnosa; pedunculi terminales, pauciflori; labellum integrum vel subintegrum, profunde concavum; columna basi teres, rostello recto; anthera dorsalis; pollinia 8, tenue clavata, glandulae affixae.

Type: Meiracyllium Reichb. f.

Possibly intermediate between the Laeliinae and the Pleurothallidinae (see Brittonia 12: 222-225. 1960), this genus does not fit well in either group, and does not seem to be closely related to Podochilus or other Asiatic genera.

Tribe PACHYPHYLLEAE, new tribe - Caules tenues, pleurophylli; pedunculi laterales vel terminales; columna plus minusve alata; pollinia 2, caudiculae 1 vel 2, stipitiformes, stipiti laminiformi affixae.

Type: Pachyphyllum Kunth

This tribe, to include the subtribes Pachyphyllinae and Lockhartiinae, is quite distinctive in the form of the pollinaria. Though the members of the two subtribes are rather different in other features, their pollinaria are so similar as to suggest a close relationship. I anticipate a system in which the tribe Vandeae of Lindley is divided into about six more uniform tribes, of which this is the only one not already given a tribal name by Pfitzer.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS
CALLICARPA. XVIII

Harold N. Moldenke

CALLICARPA L.

Additional & emended bibliography: Koord., Meded. Lands Plant. 12: [Plantkund. Woordenb.] 89 & 142. 1894; Domin, Bibl. Bot. 22 [89 (6)]: 1108--1109, text fig. 179. 1928; A. C. Martin, Am. Midl. Nat. 36: 608--609 & 650, pl. 50. 1946; Wyman, Shrubs & Vines Am. Gard. 113. 1956; Anon., Horticult. Abstr. 34: 747. 1964; El-Gazzar & Wats., New Phytol. 69: 457, 460, 469, 473, 483, & 485. 1970; Moldenke, Phytologia 21: 375--388 & 444--500. 1971.

Martin (1946) lists this genus among the genera studied by him whose seeds he ascertained to have endosperm, apparently basing his conclusion on the examination of only the seeds of C. americana. In a genus of 205 accepted specific and subspecific taxa, it would seem that results obtained from one species can hardly be regarded as providing a safe indication for the entire genus.

CALLICARPA ACUMINATA H.B.K.

Additional bibliography: Moldenke, Phytologia 21: 329, 341--344, 382, & 385. 1971.

CALLICARPA AMERICANA L.

Additional bibliography: Moldenke, Phytologia 21: 375 & 386. 1971.

Martin (1946) affirms that the seeds of this plant do possess endosperm.

CALLICARPA ANGUSTIFOLIA King & Gamble

Additional bibliography: Moldenke, Phytologia 21: 375. 1971.

Dop (1932) states that C. poilanei Dop is very closely related to C. angustifolia, differing in its almost glabrous (rather than villous) ovary, its elliptic-oblong (not lanceolate) leaf-blades which are acute (not long-attenuate) at the base, abruptly acuminate-caudate (not acutely attenuate) at the apex, and sinuate-denticulate or -dentate (not entire) along the margins, with the tomentum much finer on the lower surface.

CALLICARPA ARBOREA Roxb.

Additional & emended bibliography: Gamble, List Trees Darj. Dist. 60. 1878; E. D. Merr., Philip. Journ. Sci. Bot. 12: 298, 299, & 382. 1917; Moldenke, Phytologia 21: 375 & 387. 1971.

Gamble (1878) records the vernacular names "goehlo", "janti", and "sung-a-kung" for this plant and notes that the species grows at altitudes up to 3000 feet and is "Very common in old Mechi or Lepcha cultivations", flowering in April, fruiting in November; "Almost universal in the Terai, but most common in dry mixed for-

ests of small trees on good soil and in Savannas. Bark grey-brown. Wood brownish white, of good grain, tolerably heavy; only used for charcoal."

It ought to be noted here that Clarke (1885) lists C. farinosa Roxb. as a synonym of C. arborea, but I am regarding it as belonging in the synonymy of C. tomentosa (L.) Murr.; the C. arborea Miq., which he lists, is also a synonym of C. tomentosa.

Merrill (1917) claims that C. weberi Merr. is most closely allied to C. arborea, but differs in its much smaller cymes which are usually only once or twice forked, its smaller and fewer-veined leaves, its larger flowers, and its ovaries being slightly glandular but not tomentose.

Fletcher (1938) records C. arborea from Thailand as follows: "C. arborea Roxb. var. villosa (Roxb.) King et Gamble Mat. 803 (1909); Ridl. F. M. P. 614, in nota. C. villosa Roxb. Hort. Beng. 10 (1814). C. lanata Lam Verb. 79, pro parte, non Linn. Payap. Doi Saket, North Plateau, c. 1000 m., Hosseus 618. Pannati. Pattani, Tomo, Ban Kaung, c. 90 m., Lakshnakara 838. Distrib. Malay Peninsula, Sylhet (type)."

CALLICARPA ARBOREA var. PSILOCALYX (H. J. Lam) Moldenke

Additional bibliography: Moldenke, *Phytologia* 21: 330, 336, & 387. 1971.

Merrill (1917) affirms that C. weberi Merr. is related to this plant, but differs in its smaller leaves, densely stellate-pubescent calyx, and puberulent corolla.

CALLICARPA AREOLATA Urb.

Additional & emended bibliography: J. A. Clark, *Card Ind. Gen. Sp. Pl.* 1925; Moldenke, *Phytologia* 16: 360 (1968) and 21: 376. 1971.

CALLICARPA AUSTRALIS Koidz.

Additional & emended bibliography: Ohwi, *Fl. Jap.* 764 & 997. 1965; Moldenke, *Phytologia* 20: 495 (1971) and 21: 44. 1971.

CALLICARPA BODINIERI Léveillé

Emended synonymy: Callicarpa longifolia Hemsl. apud Rehd. in *C. S. Sarg.*, *Pl. Wils.* 3: 306, in syn. (in part). 1916 [not C. longifolia Benth., 1885, nor Hance, 1890, etc.].

CALLICARPA BODINIERI var. GIRALDII (Hesse) Rehd.

Additional bibliography: T. M. Simpson, *Gard. South. Afr.* 189. 1964; Moldenke, *Phytologia* 21: 331. 1971.

CALLICARPA BREVIPES (Benth.) Hance

Emended synonymy: Callicarpa longifolia Hook. apud P'ei, *Mem. Sci. Soc. China* 1 (3): 45, in syn. 1932 [not C. longifolia Benth., 1885, nor Hance, 1890, etc.].

Additional bibliography: Moldenke, *Phytologia* 21: 331, 333, 335, & 379. 1971.

CALLICARPA CANDICANS (Burm. f.) Hochr.

Additional & emended bibliography: Gamble, *List Trees Darj. Dist.* 60. 1878; Gamble, *Man. Indian Timb.*, ed. 1, 283 & 503. 1881; Domin, *Bibl. Bot.* 22 [89 (6)]: 1108 & 1109, text fig. 179. 1928; Moldenke, *Phytologia* 21: 329, 331—332, 340, 344—346, & 387. 1971.

Gamble (1878) refers to this species as a "Common shrub along roadsides and in waste places" in the Darjeeling district of West Bengal.

CALLICARPA DICHOTOMA (Lour.) K. Koch

Additional bibliography: T. M. Simpson, *Gard. South. Afr.* 189. 1964; Moldenke, *Phytologia* 21: 331, 333, 335, 345, & 379. 1971.

CALLICARPA FLOCCOSA Urb.

Additional bibliography: J. A. Clark, *Card Ind. Gen. Sp. Pl.* 1925; Moldenke, *Phytologia* 15: 24. 1967.

CALLICARPA FULVA A. Rich.

Additional & emended bibliography: Hill & Salisb., *Ind. Kew. Suppl.* 10: 38. 1947; Moldenke, *Phytologia* 21: 39. 1971.

CALLICARPA FULVOHIRSUTA Merr.

Additional bibliography: Moldenke, *Phytologia* 20: 495 (1971) and 21: 39 & 40. 1971.

CALLICARPA FURFURACEA Ridl.

Additional bibliography: Moldenke, *Phytologia* 14: 235 (1967) and 21: 230. 1971.

CALLICARPA GLANDULOSA Fletcher

Additional & emended bibliography: Hill & Salisb., *Ind. Kew. Suppl.* 10: 38. 1947; Moldenke, *Phytologia* 14: 237. 1967.

CALLICARPA INTEGERRIMA Champ.

Additional bibliography: Moldenke, *Phytologia* 21: 38, 40, 50, 103, 215, 222, & 223. 1971.

CALLICARPA INTEGERRIMA var. *SERRULATA* Li

Additional bibliography: Moldenke, *Phytologia* 14: 246 (1967) and 21: 225. 1971.

CALLICARPA JAPONICA Thunb.

Additional bibliography: Wyman, *Shrubs & Vines Am. Gard.* 113. 1956; Moldenke, *Phytologia* 21: 334, 338, 340, 379, & 381. 1971.

CALLICARPA JAPONICA var. *ANGUSTATA* Rehd.

Emended synonymy: *Callicarpa longifolia* Hemsl. apud Rehd. in

C. S. Sarg., Fl. Wils. 3: 369, in syn. (in part). 1916 [not C. longifolia Benth., 1885, nor Hance, 1890, etc.].

Additional bibliography: Moldenke, Phytologia 21: 154, 210, 212, & 379. 1971.

CALLICARPA JAPONICA var. LUXURIANS Rehd.

Emended synonymy: Callicarpa longifolia "sensu Li" ex Hatusima, Mem. Fac. Agr. Kagoshima Univ. 5 (3): 47, in syn. 1966 [not C. longifolia Benth., 1885, nor Hance, 1890, etc.].

Additional bibliography: Moldenke, Phytologia 21: 334. 1971.

CALLICARPA KINABALUENSIS Bakh. & Heine

Additional bibliography: G. Taylor, Ind. Kew. Suppl. 12: 27. 1959; Moldenke, Phytologia 21: 46. 1971.

CALLICARPA KOCHIANA Mak.

Additional bibliography: Moldenke, Phytologia 21: 151, 154, 215, 223, 225, 242, & 344. 1971.

CALLICARPA LANCIFOLIA Millsp.

Additional bibliography: J. A. Clark, Card Ind. Gen. Sp. Pl. 1907; Moldenke, Phytologia 16: 451—452 (1968) and 21: 233 & 235. 1971.

CALLICARPA LONGIFOLIA Lam. [not C. longifolia Benth., 1885, etc.].

Additional & emended bibliography: Domin, Bibl. Bot. 22 [89 (6)]: 1109. 1928; Moldenke, Phytologia 21: 376 & 387. 1971.

It should be noted here that the homonym, C. longifolia Benth., cited by me in Phytologia 21: 49 (1971) as having first been published in 1962, was actually effectively published in 1885.

CALLICARPA LONGIFOLIA f. FLOCCOSA Schau.

Emended synonymy: Callicarpa longifolia L. ex Wall. in Roxb., Fl. Ind., ed. 1 [Carey & Wall.], 1: 409, in syn. 1820 [not C. longifolia Benth., 1885, etc.].

Additional bibliography: Moldenke, Phytologia 21: 376. 1971.

It should be noted here that the homonym, C. longifolia Benth., cited by me in the synonymy of this form in Phytologia 21: 113 (1971) as having first been published in 1966, was actually effectively published in 1885.

CALLICARPA LONGISSIMA (Hemsl.) Merr.

Emended synonymy: Callicarpa longifolia Benth. ex C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 570, in syn. 1885.

Additional bibliography: Moldenke, Phytologia 21: 376. 1971.

CALLICARPA MACROPHYLLA Vahl

Additional bibliography: El-Gazzar & Wats., New Phytol. 69: 483 & 485. 1970; Moldenke, Phytologia 21: 376 & 387. 1971.

CALLICARPA MAINGAYI King & Gamble

Additional bibliography: Moldenke, Phytologia 21: 329, 336, & 387. 1971.

Merrill (1917) asserts that C. weberi Merr. is allied to C. maingayi.

CALLICARPA PEDUNCULATA R. Br.

Additional bibliography: Patermann, Beitr. Zytol. Verbenac. 27--28 & [55], pl. 3, fig. 22. 1935; Moldenke in Fedde, Repert. Sp. Nov. 39: 302 & 304 (1936) and 40: 96, 99--102, 109, 120, 124, 130, & 163. 1936; Beer & Lam, Blumea 2: 222. 1936; Hand.-Mazz., Beih. Bot. Centralbl. 56B: 455. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 411 & 415. 1938; Moldenke, Alph. List Common Vern. Names 33. 1939; Moldenke, Geogr. Distrib. Avicenn. 36. 1939; Cummins, Mycologia 32: 373. 1940; Moldenke, Suppl. List Common Vern. Names 3, 14, & 18. 1940; Moldenke, Prelim. Alph. List Invalid Names 9--13. 1940; Kaneh. & Hatus., Bot. Mag. Tokyo 56: 113. 1942; Lam & Meeuse in Holthuis & Lam, Blumea 5: 235. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 54--58, 61--71, & 87. 1942; Moldenke, Alph. List Invalid Names 8--11. 1942; Moldenke, Phytologia 2: 95. 1943; Moldenke, Alph. List Cit. 1: 34, 108, 109, 208, 248, & 254. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Phytologia 2: 345. 1947; Neal, In Gard. Hawaii, ed. 1, 640. 1948; Moldenke, Alph. List Cit. 2: 354, 359, 433, 456, 470, 482, & 565 (1948), 3: 702, 762, 764, & 795 (1949), and 4: 987, 1102, 1111, 1119, 1205, & 1208. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 128, 131, 133, 135, 139, 141, 143, 144, 146--148, 150, 152, 155, 157, & 177. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 279, 282, 283, 286--287, 296, & 311. 1951; Moldenke, Phytologia 4: 122--124. 1952; Moldenke, Résumé 160, 165, 168, 172, 174, 179, 183, 187, 189, 191, 194, 197, 198, 200, 203, 204, 208, 211, 214, 242, 244--248, & 444. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Moldenke, Résumé Suppl. 3: 24 (1962), 7: 6 (1963), and 11: 6. 1964; A. L. Moldenke, Phytologia 10: 239. 1964; Neal, In Gard. Hawaii, new rev. ed., 726. 1965; Moldenke, Résumé Suppl. 14: 7. 1966; Whitmore, Guide Forests Brit. Solomon Isls. 170. 1966; Moldenke, Phytologia 13: 427, 437, 467, & 502 (1966), 14: 37, 105--108, 111, 113, 118, 121, 142, & 143 (1966), 14: 225 & 228--230 (1967), and 15: 19, 21, 27, & 32. 1967; Tingle, Check List Hong Kong Pl. 38. 1967; Moldenke, Résumé Suppl. 15: 17. 1967; Moldenke, Phytologia 16: 365. 1968; Stearn, Notes & Rec. Roy. Soc. Lond. 24: 83. 1969; A. L. Moldenke, Phytologia 18: 114. 1969; Moldenke, Phytologia 21: 38, 49, 101, 102, 108, 109, 151, 153, 157, 162--164, 215, 220, 222, 223, 235, 236, 242, 336, 346, & 387--388. 1971.

Illustrations: Britten in Banks & Soland., Illustr. Austral. Pl. [Bot. Cook's Voy. 2:] pl. 237. 1901; Patermann, Beitr. Zytol. Verbenac. pl. 3, fig. 22. 1935.

Recent authors and collectors describe this plant as a large

slender bush, shrub, or small tree, 1--10 m. tall, the stems 2 cm. in diameter, the leaf-blades gray-green and softly pubescent or bright-green above and light-green beneath, the flower-buds lilac, the flowers fragrant, calyx pale- or light-green, corolla pink, pinkish-purple, or pale-purple to lavender, orchid, light-violet, mauve, or even white, the petals 4 and minute, filaments deep-purple or light-violet to mauve, anthers yellow or light-yellow, and the fruit green when immature, eventually purple, bright-purple, pale- or deep-lilac, or violet, not white. They have found it flowering from April to July, October, and November and fruiting in January, July, and September to November, growing from sealevel to 700 meters altitude, inhabiting forests, the margins of rainforests, the edge of woods, base of cliffs, and cultivated ground, growing on limestone near riverbanks, in alang-alang (Carangium odoratum) fields, in grass savannas of low-lying areas, and in the tracks in grasslands. Beer & Lam (1936) report it as "common in forest regrowths", Mrs. Clemens describes it as a "shrub in rocks with Rapanea and Glochidion", while Brass calls it "sporadic in secondary grassland" on Fergusson Island.

The corollas are described as "lavender" on F. R. Fosberg 14204 and G. P. Wilder s.n. [Nov. 28, 1930], "pink" on Brass 27347, M. K. Clemens s.n. [Mount Coolum, 3 April 1945], and P. Rankin s.n. [Jan. 3, 1945], "orchid" on Sigafoos 136, "mauve" on Kajewski 1361, "pale-lilac" on C. B. Robinson 300, "pale-purple" on Hoogland 4246, "pinkish-purple" on Womersley & Floyd 6806, and "white" on C. B. Robinson 299.

It is worth noting here that the C. cana of Dalzell & Gibson is actually C. tomentosa (L.) Murr., that of Gamble is C. macrophylla Vahl, that of Wallich is in part C. longifolia Lam., and that of Linnaeus, of Sprengel, and of Vahl is C. candicans (Burm. f.) Hochr.; the C. cuspidata credited to Lam & Bakhuizen van den Brink is C. longipes Dunn, that credited to Bakhuizen alone is in part C. longipes and in part C. rubella Lindl., and that credited to Hasskarl is C. longifolia Lam.; the C. dentata credited to Roxburgh is C. candicans (Burm. f.) Hochr. while that of Pavon and of Sessé & Mociffo are Cornutia grandifolia (Schlecht. & Cham.) Schau.; and the C. lanata of Gamble is C. vestita Wall., that of Linnaeus and of Wallich is C. tomentosa (L.) Murr., that of Hosséus is C. arborea Roxb., that of H. J. Lam is C. arborea var. psilocalyx (H. J. Lam) Moldenke, and that of Lamarck is Premna odorata Blanco.

Hasskarl's reference (1844), given in the above bibliography, is often cited as "Cat. Pl. Bot. Bogor. Cult. 2: 136--137" or as "2° Cat. Buitenz."

The Sprengel (1825) reference is incorrectly cited by Hasskarl (1844) as "2: 420". The Lam & Meeuse reference (1942) also cited above is sometimes cited as "1945" or "1946", but actually

bears the inscription "issued June 15th, 1942". These authors cite a no. 3429 from Nenoesa in the Talaud Islands, describing the plant as about 1 m. tall, leaves bright-green above, light-green beneath, calyx light-green, corolla light-violet, and anthers yellow, growing in cultivated ground, at 100 meters altitude, flowering in June. They give the overall distribution of the species as "Malay Peninsula to Australia".

Brown's original (1810) description of C. pedunculata is "foliis ovatis acutis dentato-serratis basi obtusissimâ: adultis suprâ scabris subtus cinereo-tomentosis, pedunculo petiolum paulo superante. (T.) v.v." The original description of C. cuspidata by Wallich (1820) is "Shrubby, all the tender parts, and the under surface of the short-petioled, elliptic, dentate, cuspidate. Leaves woolly. Corymbs axillary, their division and the calyces clothed with minute grains under the wool. A native of the Moluccas; the leaves are always acutely dentate, and end in a long taper, acute point. The Berries are very small, smooth and purple." The fruits, of course, are drupes, not berries.

The original description of C. lanata by Vahl (1794) is as follows: "Callicarpa lanata foliis ovatis basi rotundatis integerrimis subdenticulatis, supra rugosis subtus ramisque lanato-tomentosis. Tomex tomentosa. LIN. fl. Zeyl. pag. 24. fide herb. Hermannii. Callicarpa lanata (tomentosa S. V. p. 153) foliis integerrimis lanatis. LIN. Mant. p. 331. Rami, uti petioli, folia subtus e pedunculi, tomento densissimo tecti. Folia ovata, attenuata, 4--5 pollicaria, basi pollices tres lata, nervis supra villosis incanis, rugosa, integerrima vel extrorsum dentibus obscure dentata: dentibus acutis. Inflorescentia ut in reliquis." Obviously it is C. tomentosa (L.) Murr. which he is here describing.

As to the overall geographic distribution of the true C. pedunculata, Beer & Lam (1936) say "Formosa, Philippines, East Malaysia to Polynesia", King & Gamble (1908) say "Malay Archipelago, Tropical Australia", Domin (1928) says "Von Penang über Malaya nach Australien (Nord-Australien, Queensland, nördl. N. S. Wales", Lam (1914) gives it as "P. Pinang; Java; Celebes; Ambon; Key-Insl.; Niederl. Neu Guinea; Kais. Wilh. Land; Neu-Mecklenberg; New-Pommern; Uatom; trop. Australien", while in his 1924 work he modifies this to "Penang, Malayischer Archipel, Bismarck-Archipel, tropisches Australien", Lam & Meuse (1942) give it as "Malay Peninsula to Australia" and record it from Nenoesa Island on the basis of their no. 3429, while Kanehira & Hatusima (1942) say "Philippines, East Malaya to New Guinea and Polynesia". Bentham & Mueller (1970) comment that "The species is also in the Archipelago and is closely allied to the widely diffused C. Macrophylla, Vahl. Schauer refers it to 'C. lanata Vahl Symb. iii. 13', but if he had turned to the page he quotes, he would have seen that the name is Linnaeus' not Vahl's and relates to the very different Ceylon species which Schauer has published under the name C. Wallichiana."

Lam (1919) includes a C. dentata Wall., in part, no. 6319, in the synonymy of C. pedunculata, but I regard this binomial as belonging to the synonymy of C. longifolia Lam. He gives the distribution of C. pedunculata as "P. Penang, Malay Archipelago (Java!, Celebes!, Wetar!, Amboina!, Key-is., Dutch-New-Guinea!, Kais.-W.-land), Bismark-archipelago!, tropical Australia". He comments that "Its affinities are with C. rubella, C. pilosissima Max. (from Formosa), C. caudata and C. macrophylla. The leaves, however, never have a distinctly cordate base, as in C. rubella, are never as narrow as in C. pilosissima, have never an acute or cuneate base as in C. caudata, nor are as long and wide as the leaves of C. macrophylla, which are coarsely dentate and have their greatest breadth near the base." In discussing C. rubella he says "Its affinity is, especially in regard with the flower, with C. pedunculata, but its leaves are always cordate, subsessile and narrower, whilst its cymes are smaller, fasciculate, not widely dichotomous as in C. pedunculata."

Interestingly enough, Steudel (1821) notes "cfr. Callicarpa dentata" in his entry for C. pedunculata, while in his 1840 work he actually includes a C. lanata "Linn." in the synonymy on the authority of Sprengel. The Schultes (1827) ask "videtur eadem, ac lanata. Quid Callicarpa macrocarpa Raeusch.? -- sinensis Noisette?" The last two names referred to in this quotation are actually synonyms of C. candicans (Burm. f.) Hochr.

Britten (1901) reduces C. lanata "Schauer (non Vahl)" to synonymy under C. pedunculata; Rehder (1914) also gives "C. lanata, Schau., not Linn." as a synonym, while Jacques & Hérinco (1851) adopt C. lanata "Vahl" as the accepted name for the taxon, reducing C. pedunculata R. Br. to synonymy under it.

Ridley (1923) includes C. pedunculata only under "Excluded Species" for the Malay Peninsula, commenting that the "Wallich, 1834, no. 2" cited by Gamble is "Hamilton, 1834" from Penang, but actually represents what is now called C. candicans (Burm. f.) Hochr. He states categorically that "There is no evidence for Callicarpa pedunculata occurring in the [Malay] Peninsula".

It should also be noted here that C. B. Robinson 300, from Amboina, was at first regarded by Merrill and others as representing the Mamanira alba of Rumphius (1743), but the latter is now regarded by me as belonging to the synonymy of Callicarpa longifolia Lam. Stapf, however, in 1929 still cites Rumphius' pl. 59 as illustrating "C. cuspidata".

Sprengel (1825) places C. pedunculata in the synonymy of what he calls C. lanata L. [now known as C. tomentosa (L.) Murr.] along with C. dentata Roth and C. incana Roxb. [the latter now regarded as C. macrophylla Vahl]. He regarded C. cuspidata Roxb. as a distinct species from C. pedunculata, this being quite under-

standable if C. pedunculata is regarded as a synonym of C. tomentosa. Bakhuizen van den Brink (1921) also kept C. pedunculata and C. cuspidata apart as separate species. In the synonymy of the former he placed C. americana Blanco, C. bicolor F. Vill., C. blancoi Rolfe, C. formosana Rolfe, C. ovata C. B. Robinson, and C. stenophylla Merr. -- actually, C. formosana and C. stenophylla are valid species [albeit the former is very close to C. pedunculata] and the other binomials he cites are all synonyms of C. formosana Rolfe. Under "C. cuspidata Roxb." he places, as synonyms (almost unbelievably!) C. acutidens Schau., C. caudata Maxim., C. lancifolia Merr., C. longipes Dunn, C. micrantha Vidal, C. pilosissima Maxim., C. psilocalyx C. B. Clarke, C. rubella Lindl., C. sessilifolia Wall., C. tenuiflora Champ., and Mamanira Rumph. Of these, C. acutidens, C. caudata, C. longipes, C. micrantha, C. pilosissima, C. psilocalyx, and C. rubella are all valid and distinct species, while C. lancifolia Merr. is a synonym of C. merrillii Moldenke, C. sessilifolia Wall. and C. tenuiflora Champ. are synonyms of C. rubella Lindl., and Mamanira alba Rumph. is C. longifolia Lam. Because of this amazingly broad concept of the species in question, his description and his statement of geographic distribution are useless. He comments under what he calls C. lanata Zipp. "Perhaps this species is identical with C. cana or C. cuspidata Roxb." -- I regard it as C. pedunculata R. Br.

Chang (1951) includes under C. pedunculata the C. formosana of Rolfe, the C. aspera of Handel-Mazzetti, and the C. rubella f. robusta of P'ei. I follow Merrill in regarding C. formosana as valid, with C. aspera as a synonym, and also accept C. rubella f. robusta as valid. Obviously, however, C. pedunculata is very closely allied to C. formosana. The latter may actually be only a variety of the former or they may even be the same taxon as Bakhuizen (1921), Chang (1951), and others maintain.

Vernacular names recorded for C. pedunculata are "a cibulit", "a peptipinagut", "beauty-berry", "bëning-bëning rih", "mëñiran", "katoempang", "mëmëñiran", "ringan", "ringan-ringan", and "wild heliotrope".

Kajewski tells us that on Guadalcanal island when a small baby in arms is sick the fruit of this plant is chewed with a betel nut and spat into the baby's mouth. N. E. Brown (1890) informs us that the species was introduced into cultivation in 1788 from the East Indies. According to Cummins (1940) it is attacked by the fungus, Uredo callicarpae Petch, as can be seen on herbarium specimens of Clemens & Clemens 1368, 1452, & 1453 from Papua. The Herb. Prager 18667 from New Britain was erroneously labeled by someone as from "New England"

Bentham & Mueller (1870) cite Beckler s.n. and C. Moore s.n.

from New South Wales, R. Brown s.n. from the Northumberland Islands, and A. Cunningham s.n., Dallachy s.n., W. Hill s.n., F. Mueller s.n., "and others" from Queensland. King & Gamble (1908) cite Wallich 1834 (2) & 6319. Bakhuizen van den Brink (1921) cites Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 44601] as C. cuspidata Roxb., but it is very plainly typical C. merrillii Moldenke. Lam (1924) cites Lauterbach 2449 and Rudolph 6 from the Territory of New Guinea, Lauterbach 207 and Dahl s.n. [30 Okt. 1896] from New Britain, and Peckel 61 from New Ireland. Domin (1928) cites A. Dietrich 409, 1341, 1342, 1453, 1762, 2525, 2534, & 2610 and Domin s.n. [Tambourine Mts., III.1910] & s.n. [Yabarra, I.1910] from Queensland. Kanehira & Hatusima (1942) cite their nos. 13539, 13633, & 13975 from the Arfak Mountains of West Irian, at 1900 meters altitude. Whitmore (1966) cites Rechinger 4672 & 4856 from the Solomon Islands.

Chang (1951) cites the following collections, but since he includes C. formosana Rolfe and C. rubella f. robusta P'ei in his concept of C. pedunculata, these citations are wholly unreliable and I seriously doubt if any of them actually represent the true C. pedunculata: CHINA: Chekiang: nos. 1838, 14128, & 43949. Fukien: S. T. Dunn s.n. and nos. 37, 97, 264, 312, 435, 727, 1204, 2677, & 3021. Kiangsi: nos. 3924, 4469, & 20874. Kwangsi: nos. 4209, 8755, 21989, 22982, 23820, 24642, 26530, & 26548. Kwangtung: Tse Hai 413, T. M. Tsui 119, 211, & 613, Tutchet s.n., and nos. 48, 347, 650, 696, 1031, 1032, 1342, 1438, 1663, 2047, 2158, 2434, 2821, 3592, 4874, 4960, 5147, 5707, 5715, 7555, 9804, 10799, 12008, 20315, 20496, 21152, 21388, 21460, 21586, 23993, 24455, 25228, 25344, 25596, 25924, 26381, 26410, 28715, 29947, 32250, 40774, 40911, 42765, 50349, 60577, 61256, 80628, & 84356. HAINAN: nos. 96, 850, 2706, 5002, 5801, 6029, 23688, 25696, 27690, & 44757. FORMOSA: K. Mori s.n., G. Saito 7657, Y. Shimada s.n., T. Tanaka s.n., and nos. 10988, 72750, 75765, 92772, & 151891. Unfortunately, Chang gives the collector and/or herbarium names corresponding to the above numbers only in Chinese characters and I have not as yet been able to have these translated.

Material of C. pedunculata has been misidentified and distributed in herbaria under the names C. acuminata Roxb., C. americana Hort., "C. cana L. sens. lat.", C. japonica Thunb., C. longifolia Lam., and C. villosa Vahl. On the other hand, the D. Fairchild 1015, Koorders 29459b [339*], and Ouwenshand 56, distributed as C. pedunculata, are actually C. brevipetiolata Merr.; Beguin 1214, Bloembergen 4431, Brass 5520, Docters van Leeuwen 10106, Giulianetti s.n., Koorders 19485b & 19498b [448], Main & Aden 947, Mayr 104, Mearns & Hutchinson 4755, E. D. Merrill 11689, Ramos & Edaño

s.n. [Herb. Philip. Bur. Sci. 40505], C. B. Robinson 299, Teijsmann 8942, and Walsh 467 are C. caudata Maxim.; Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 45614] is C. elegans Hayek; Ahern 811Q and Hosokawa 9905 are C. formosana Rolfe; E. D. Merrill 1718 is C. formosana f. angustata Moldenke; Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 28513] is C. formosana var. glabrescens Moldenke; Clemens & Clemens 1416 is C. longifolia Lam.; Zollinger 350 is C. mollis Sieb. & Zucc.; F. R. Fosberg 14204, Kostermans 2609, and C. B. Robinson 300 are C. pedunculata var. glabriuscula H. J. Lam.; Kjellberg 3889 and Rachmat 206 are C. pilosissima Maxim.; Weiss 1586 is C. rubella var. hemsleyana Diels; and Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 37635] is C. stenophylla Merr.

The Hort. Huber 725, cited below, was previously erroneously cited by me as C. longifolia Lam. The Guadalcanal specimens, also cited below, do not have the aspect of C. pedunculata and may, on further study, prove to represent something else. Herb. Hort. Bot. Bogor. XV.J.A.XXIX.6 is a mixture of C. pedunculata and its var. glabriuscula H. J. Lam.

In all, 147 herbarium specimens and 6 mounted illustrations of the typical form of this species have been examined by me.

Additional citations: INDIA: State undetermined: J. D. Hooker 19 (S); Roxburgh s.n. (S); T. Thomson s.n. [Plan. Ganget. inf.] (S). MALAYA: Pahang: Corner 29837 (Bz--72765). Penang: Wallich 1834/1 (K). GREATER SUNDA ISLANDS: Anambas: M. R. Henderson 20491 (Bz--18014). Java: Bakhuizen van den Brink 806 (Bz--25477); Teijsmann s.n. [1868] (M1). Nanoesa: H. J. Lam 3429 (Bz--17539, Bz--17540). Sumatra: Bünnemeijer 47 (Bz--17980). LESSER SUNDA ISLANDS: Timor: Forbes 3465 (Bz--18112), 3601 (Bz--18113); Herb. Torrey s.n. (T); Walsh 111 (Bz--17494, Bz--17495). MOLUCCA ISLANDS: Amboina: Boerlage 9 (Bz--18116, Bz--18117), 227 (Bz--18115); Rant 88 (Bz--18119), 96 (Bz--18114); C. B. Robinson 299 (W--654617, W--1294194). Banda: Treub 391 (Bz--18122). Boano: Kornassi 1285 (Bz--18123, Ca--236814, Ut--80239). Buru: Sapin 470 (Bz--18124). Elat: H. Jensen 143 (Bi, Bz--18126). Halmahera: Anang 592 (Bz--72983); H. J. Lam 3761 (Bz--18128, N); Teijsmann 7787 (Bz--17500, Bz--17501). Ternate: Beguin 1229 (Bz--17503). Timor Laoet: Buwalda 4362 (Bz--72567). Toeal: H. Jensen 33 (Bi, Bz--18125). NEW GUINEA: Papua: Chalmers s.n. [Lome Rg.] (Mb), s.n. [South Cape] (Mb), s.n. (Mb); Clemens & Clemens 1368 (Ah), 1453 (Ah), 3264a (Ah), s.n. [Suppl., July 16/36] (Ah); Hollrung 546, in part (Bz--18129, Mb); Hoogland 4246 (Ng--16830); Mac Gregor s.n. [1890] (Mb). Territory of New Guinea: Hollrung 546, in part (Mb); Womersley & Floyd 6806 (Bi, Ng--16936). West Irian: Sigafoos 136 (M1, W--1942841). NEW GUINEAN ISLANDS: Fergusson:

Brass 27347 (W—2408591). BISMARK ARCHIPELAGO: New Britain: Herb. Prager 18667 (Gg—31965); R. Parkinson s.n. [1901] (Vt). SOLOMON ISLANDS: Guadalcanal: Kajewski 2420 (Bi, Bz—18160, Bz—18161). AUSTRALIA: New South Wales: Boorman s.n. [Mt. Perry, 8.1912] (Ca—176563); W. Forsyth 10-98 (Ca—25096); Herb. Forest Dept. Sydney 485 [2209] (Na—16271); Maiden & Boorman s.n. [Byron Bay, 11-03] (Po—64807, Vt); E. G. McLean 54 (W—1092061), s.n. [Casino, 4-18] (W—1596134); "N. B." 176 [Richmond River] (Go). Queensland: F. M. Bailey s.n. (W—73329); Boorman s.n. [8.1912] (B); Brass 2356 (B, Bi); M. K. Clemens s.n. [Sept. 21, '43] (Or—47686, Or—47952), s.n. [Mount Coolum, 3 April 1945] (Ca—81172, Mi), s.n. [August-October 1947] (N, S), s.n. [Dalrymple Heights, Oct./Nov. 1947] (Mi); A. Cunningham 82 (N); A. Fielding 13059 (Go); Flecker 14095 (N); Herb. Bogor. 17561 (Bz), 18164 (Bz), 18165 (Bz); Herb. Mus. Nac. Hist. Nat. Chile 25556 (Sg); Kajewski 1361 (W—1550862), 1405 (S); Michael 309 (Bz—18163); C. T. White 1361 (N, S, S), 1405 (N, S), 1957 (Bz—18162), 8981 (N, N). GREAT BARRIER REEF: Lizard: Collector undetermined 48 (S). CULTIVATED: France: Hort. Huber 725 (M, Z—photo). Hawaiian Islands: A. Forbes 21 (Bi); Judd, Bryan, & Neal s.n. [June 6, 1932] (Bi); P. Rankin s.n. [Jan. 3, 1945] (Bi); G. P. Wilder s.n. [Nov. 28, 1930] (Bi). India: Herb. Hort. Bot. Calcutt. s.n. (Bz—18158, Bz—18159, Mu—1160, N—photo, T, T, X, Z—photo). Java: Groot Keij 2288 (Bz—18127); H. Hallier C.122 (X); Herb. Hort. Bot. Bogor. XI.G.48a (Bz, Bz), XI.G.48 en a (Bz—25727, Bz, Bz), XI.G.49a (Bz, Bz, Bz, N, N), XI.G.92 (Bz—18110, Bz—25796, Bz, Bz), XI.G.92a (Bz—18111), XV.F.30 (Bz—26344, Bz, Le, N), XV.F.30a (Bz—26345), XV.J.A.XXIX.6, in part (Bz—25729, Bz, Bz, Bz, N), XV.J.A.XXIX.7 (Bz—18120, Bz—18121), s.n. [Banda] (Bz—18108), s.n. (Bz—18106, Bz—18107, Bz—18109, Bz—25728). LOCALITY OF COLLECTION UNDETERMINED: Herb. Bogor. 18105 (Bz). MOUNTED ILLUSTRATIONS: Ferd. Bauer, Icon. Nov. Holl. 965 (V), 965a (V).

CALLICARPA PEDUNCULATA var. *GLABRIUSCULA* H. J. Lam in H. Hallier, Meded. Rijksherb. Leiden 37: 33—34. 1914.

Synonymy: *Callicarpa novoguineensis* Loes. ex H. J. Lam, Verbenac. Mal. Arch. 57, in syn. 1919.

Bibliography: H. J. Lam in H. Hallier, Meded. Rijksherb. Leiden 37: 33—34. 1914; H. J. Lam, Verbenac. Mal. Arch. 57. 1919; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Kaneh. & Hatus., Bot. Mag. Tokyo 56: 113. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Résumé 245 & 246. 1959.

Lam's original (1914) description of this variety is "Folia supra sparse pubescentia (pilis simplicibus), subtus laxe stellato-puberula, glanduloso-punctata, utrinque in nervis densius vestita; flos calyce extus laxiuscule puberulo" and bases the taxon on El-

bert 4503 & 4631 from "Wetar, Hochfläche von Mangowe bei Laswerang, 600—800 m." In his 1919 work he modified the description to read "foliis supra pilis simplicibus sparsis, subtus pilis stellatus sparsis tecta, glandulosa; nervis utrinque densius pilosis; calyx minus dense pubescente," and cites three collections: (1) Blume? s.n. from Java, deposited in the Rijksherbarium at Leiden as sheet number 908265-1115, (2) H. Hallier C.121 from Key Island "imported into Buitenzorg and cultivated there sub signo XI.G.49", and (3) Elbert 4503 from Mangowe, near Saiwerang, Wetar, altitude 600—800 meters, collected February 19, 1910. He comments that "This variety has an affinity with C. macrophylla, with which some authors confound the species, by the form of its leaves, especially in regard with the base." Kanehira & Hatusima (1942) cite Brass 13356 & 14133 from New Guinea. This collector found the plant growing in dense rainforests at 50 meters altitude, flowering in July.

Some of the Herb. Hort. Bot. Bogor. XI.G.49 specimens examined by me do not differ appreciably from typical C. pedunculata, and probably actually represent XI.G.49a. Many sheets comprise both collections together and are inscribed "XI.G.49 en a".

In all, 16 herbarium specimens have been examined by me.

Citations: MOLUCCA ISLANDS: Amboina: C. B. Robinson 300 (Bz—18118, N, W—654618). NEW GUINEA: West Irian: Kostermans 2609 (Bz—26605, Bz, Bz, N). CULTIVATED: Hawaiian Islands: F. R. Fosberg 14204 (Bi, N, N). Java: H. Hallier C.121 (X); Herb. Hort. Bot. Bogor. XI.G.49 (Bz—25730, Bz—26521, Bz, N), XV.J.A. XXIX.6, in part (N).

CALLICARPA PEDUNCULATA var. GLANDULOSA H. J. Lam, Verbenac. Mal. Arch. 57. 1919.

Bibliography: H. J. Lam, Verbenac. Mal. Arch. 57. 1919; H. J. Lam in Engl., Bot. Jahrb. 59: 88. 1924; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Résumé 246. 1959.

Lam's original (1919) description of this variety is "folia angustiora, basi angustiori, latitudine majore supra medium, dentibus marginibus minutioribus; calyx pilis longis glanduliferis vestitus." He based the variety on two cotype collections: (1) Forsten s.n. from Tondano, Celebes, collected in May 1840, and deposited in the Rijksherbarium at Leiden as sheets number 908266-1226 & 908266-1227, and (2) Hollrung 210 from Sattel Mountain near Finschhafen, West Irian, collected in July 1886, and probably also deposited in the Leiden herbarium. In his 1924 work he cites only Hollrung 210. The plant has been collected in flower and fruit in May and July. As yet I have seen no material of it. In previous publications I regarded the variety as invalid, but it seems to me now that the characters given for it by Lam render it sufficiently distinct to be worthy of nomenclatural designation.

CALLICARPA PEDUNCULATA var. PSILOCALYX H. J. Lam, Verbenac. Mal. Arch. 57--58. 1919.

Bibliography: H. J. Lam, Verbenac. Mal. Arch. 57--58. 1919; H. J. Lam in Engl., Bot. Jahrb. 59: 88. 1924; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Résumé 246. 1959.

Lam's original (1919) description of this taxon is "calyx glaber vel margine singulis pilis suffultus, eglandulosus". He bases it on four cotype collections, all from West Irian and probably all deposited in the Rijksherbarium at Leiden: (1) Nyman 580 from Saedel-Mountain, altitude 750 m., collected in July 1899, (2) Schultze 194 from Augusta River, collected in January 1913, (3) Schultze s.n. from near Sepik River, collected on January 26, 1910, and (4) Schlechter 16731 from woods in the Hani Mountains, at about 800 m. altitude, collected on October 27, 1907. In his 1924 work Lam cites the same four collections and no others. The plant has been collected in anthesis in January and July and in fruit in July and October. As yet I have seen no material of it and in previous publications did not recognize its validity.

CALLICARPA PETELOTII Dop, Bull. Soc. Hist. Nat. Toulouse 64: 510. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 499--501 & 510--512. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 59 & 87. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 76. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 177. 1949; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Moldenke, Résumé 175 & 444. 1959; Moldenke, Phytologia 21: 331, 333, & 335. 1971.

Dop (1932) describes this species as "Frutex 5--6 m. altus. Ramuli subquadrangulares, glabri sed abundanter glandulosi. Folia papyracea, lanceolata, basi acuta et longe attenuata, apice acuta et longe acuminato-caudata, utrinque glabra et copiose glandulosa, supra brunnea et subtus viridia in sicco, 13--18 cm. longa x 3--4.5 cm. lata; nervus subtus prominens; costae 22--24 tenues, prominentes, ascendentes et regulariter recurvatae ad margines; venae paralleles; reticulationes paullo conspicuae; petiola gracilia, glandulosa paullo alata, 1--2.5 cm. longa; linea interpetiolarum conjuncta. Inflorescentiae; cymae puberulae, dichotomae, multiflorae 2 cm. longae x 3 cm. latae; bracteae subulatae; pedunculi 10--12 mm. longi; pedicelli 2 mm. longi....flores ignoti.... Fructus: drupa minima, glabra sed glandulosa, calyce truncato glabro, glanduloso, in dimidia parte cincta, 1 mm. lata."

The species is based on Pételot 3898 and 3916, both collected in open forests, at 1100 meters altitude, in the Massif de Tam Dao, Tonkin, Indochina. Dop (1932) comments that "Cette espèce insuffisamment connue, est remarquable par l'extrême abondance de ses glandes. Par la forme des feuilles, la dimension et la disposition des cymes, elle se rapproche du C. longifolia. Par contre, son ovaire glabre, ses rameaux et ses feuilles glabres ponc-

tués de tres nombreuses glandes la rapprochent des C. dichotoma et C. brevipes. Peut être est-ce une espèce formée par hybridation, le caractère de l'ovaire glabre étant un caractère dominant!

The plant has been collected in fruit in November.

In all, 7 herbarium specimens, including both cotype collections, and 2 mounted photographs have been examined by me.

Citations: INDOCHINA: Tonkin: Pételot 3898 (N—cotype, W—1717034—cotype), 3916 (Bz—18593—cotype, It—cotype, N—cotype, N—photo of cotype, W—1759303—cotype, Z—photo of cotype), 6726 (N).

CALLICARPA PHANEROPHLEBIA Merr., Philip. Journ. Sci. Bot. 12: 301. 1917.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 12: 301 & 382. 1917; E. D. Merr., Enum. Philip. Flow. Pl. 3: 387. 1923; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 177. 1949; Moldenke, Résumé 183 & 444. 1959; Moldenke, Phytologia 15: 21. 1967; Moldenke, Résumé Suppl. 15: 11. 1967; Moldenke, Phytologia 21: 152 & 334. 1971.

A shrub, about 2 m. tall, the younger parts distinctly stellate-tomentose with pale-brownish hairs, the older parts glabrous; branches terete, brownish, glabrous; branchlets very slender, the younger parts densely stellate-tomentose; leaves decussate-opposite; petioles about 3 mm. long, stellate-tomentose; leaf-blades chartaceous, olivaceous above, brownish-olivaceous beneath (in drying), lanceolate to oblong-lanceolate, 11--15 cm. long, 2--4 cm. wide, narrowed upwards to the very slender caudate-acuminate apex (the acumen itself 1--2 cm. long), prominently dentate-serrate along the margins with somewhat apiculate teeth, obtuse at the base, somewhat shiny and glabrous above or with the midrib somewhat stellate-tomentose, shiny and with very numerous shiny glands in minute pits beneath, with the midrib and sometimes the secondaries stellate-tomentose; secondaries about 7 per side, very prominent, arcuate-ascending, anastomosing; vein and veinlet reticulation lax, prominent; cymes axillary, solitary, few-flowered, very lax, to 6 cm. long and wide, dichotomously branched, more or less stellate-tomentose; peduncles about 2 cm. long; pedicels about 0.5 mm. long, "jointed to the branchlets" (according to Merrill); bractlets linear, 1--1.5 mm. long; calyx cupuliform, about 1.4 mm. long and wide, its rim truncate or very obscurely 4-toothed; corolla purplish; drupes globose, about 3 mm. in diameter, glabrous, wrinkled when dry.

The type of this species was collected by Maximo Ramos and Gregorio E. Edaño (Herb. Philip. Bur. Sci. 26233) in open places along streams, at an altitude of about 50 meters, on Mount Umingan, Nueva Ecija Province, Luzon, Philippine Islands, on August 8, 1916, and was deposited in the herbarium of the Bureau of Science at Manila, now unfortunately destroyed.

Merrill (1917) comments that this is "A species well characterized by its slenderly caudate-acuminate, prominently toothed, near-

ly glabrous, very prominently nerved leaves, and its lax, few-flowered inflorescences. It is perhaps as closely allied to Callicarpa dolichophylla Merr. as to any other described species, but is entirely different in its vegetative and inflorescence characters."

Material of this species has been misidentified and distributed in herbaria under the names C. elegans Hayek, C. formosana var. glabrescens Moldenke, and C. japonica var. dichotoma (Lour.) Bakh.

Six herbarium specimens, including an isotype, have been examined by me.

Citations: PHILIPPINE ISLANDS: Luzon: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 26333] (N--isotype). Mindanao: Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 49011] (Bz--17656, Bz--17657, Ca--324035, N, W--1527938).

CALLICARPA PILOSISSIMA Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 75 & 76. 1886.

Synonymy: Callicarpa pillosissima Maxim. ex Lee & Keng, Taiwania 1 (5): 5, sphalm. 1954. Callicarpa acuminatissima Liu & Tseng, Quart. Journ. Taiwan Mus. 10 (2): 55. 1957 [not C. acuminatissima Teijsm. & Binn., 1919]. Callicarpa pilosissima Maxim. ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Bibliography: Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 75 & 76. 1886; Maxim., Mém. Biol. 12: 504, 506, & 507. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 254. 1890; Henry, Trans. Asiatic Soc. Japan 24, Suppl. 70. 1896; J. Matsum., Bot. Mag. Tokyo 13: 114--115. 1899; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 73. 1901; Matsum. & Hayata, Enum. Pl. 298--299. 1906; Kawakami, List Pl. Formos. 84. 1910; J. Matsum., Ind. Pl. Jap. 2 (2): 530. 1912; H. J. Lam, Verbenac. Mal. Arch. 58 & 65. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 23. 1921; T. Itô, Taiwan Shokubutsu Dzusetsu [Illustr. Formos. Pl.], ed. 1, 7, pl. 604 (1927) and ed. 2, 7, pl. 604. 1928; S. Sasaki, List Pl. Formos. 350. 1928; Yamamoto, Journ. Soc. Trop. Agr. Formos. 6: 554--555. 1934; Kanehira, Formos. Trees, ed. 2, 645--646 & 716, fig. 602. 1936; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 73. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56, 57, & 87. 1942; Moldenke, Bol. Soc. Venez. Cienc. Nat. 11: 49. 1947; Moldenke, Alph. List Cit. 4: 985 & 1136. 1949; Moldenke, Phytologia 3: 139 & 140. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 131, 133, 146, & 177. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 280, 281, 291, & 311. 1951; Moldenke, Phytologia 4: 75 & 122. 1952; Lee & Keng, Taiwania 1 (5): 5. 1954; Liu & Tseng, Quart. Journ. Taiwan Mus. 10 (2): 55--56, pl. 1 & 2. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 73. 1959; Moldenke, Résumé 168, 172, 187, 194, & 444. 1959; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1202 & 1210, pl. 1010 & 1018. 1962; Moldenke, Résumé Suppl. 3: 30. 1962; Li, Woody Pl. Taiwan 818, 819, & 944. 1963; Moldenke,

Phytologia 13: 499 (1966) and 14: 141 & 142. 1966; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 16: 18. 1968; Moldenke, Phytologia 21: 109. 1971.

Illustrations: T. Itô, Taiwan Shokubutsu Dzusetsu [Illustr. Formos. Pl.], ed. 1, pl. 604 (1927) and ed. 2, pl. 604. 1928; Kanehira, Formos. Trees, ed. 2, 646, fig. 602. 1936; Liu & Tseng, Quart. Journ. Taiwan Mus. 10: pl. 1 & 2. 1957; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: pl. 1010 & 1018. 1962.

The original description of this species by Maximowicz (1886) is "Pilis setosis gilvis patentibus ad ramulos petiolos cymas et paginam inferiorem foliorum dense hirsuta, foliis breve petiolatis ex lineari oblongolanceolatis sensim longe acuminatis basi subcordatis obsolete serrulatis, superne pilis albidis brevioribus dense molliter pubescentibus; pedunculis petiolos duplo superantibus, cymis divaricatobifidis densiusculis, calyce hispido obtuse dentato, corollae glabrae lobis tubo apice dilatato plus triplo brevioribus, staminibus corollam stylumque leviter bilobum triplo superantibus. Formosa (Oldham! n. 387. flor.). Similis Callicarpa angustae Schauer (Cuming! no. 1425) e Philippinis, quae tamen differt pube, foliis subtus incanis basi cuneatis, corolla extus tomentosa; nec non Callicarpa caudatae m., cujus diagnosim inserere liceat."

Recent collectors describe this plant as a bush or shrub, 2—3 m. tall, the corollas pale-purple or violet, inhabiting mountains and woods, to 600 m. altitude, flowering in February, September, and December, fruiting in September. Wilson reports it "abundant in forests" on Formosa. Vernacular names reported for it are "ang-bîn nañg-chiong-kun", "aoge-murasaki", "hosoba-murasaki", "kyabazyu-bazyu", "narrow-leaved beauty-berry", "rakabo", and "Taiwan beauty-berry". The corollas on Gressitt 247 are described as "pale-purple" and those on T. Kaudern 424 as "violet". The C. acuminatissima Teijsm. & Binn., referred to in the synonymy above, is the name-bringing synonym of Geunsia acuminatissima (Teijsm. & Binn.) H. J. Lam.

Henry (1896) cites A. Henry 267, Matsumura (1899) cites Owatari s.n. and Tashiro 18a, while Matsumura & Hayata (1906) cite Hayata s.n., Kawakami s.n., Miyake s.n., Owatari s.n., and Tashiro s.n. Chang (1951) cites Oldham 387 (the type) and Tanaka & Shimada 13419, but the latter is regarded by me as representing var. henryi Yamamoto. Li (1963) does not regard Yamamoto's variety as distinct and cites Faurie 1468, Gressitt 247 & 267, A. Henry 120, Kawakami & Shimada s.n., Keng s.n., Miyake s.n., Oldham 387, Owatari s.n., Price 41, Suzuki 19262 & s.n., Tanaka 5477, Tanaka & Shimada 13419, Tashiro A.18, and E. H. Wilson 9649 & 11088. All these collections are from Formosa, and Matsumura & Hayata (1906) actually assert that the species is endemic to that island.

Lam (1919) asserts that the species is related to C. caudata

Maxim., C. macrophylla Vahl, C. nudiflora Hook. & Arn., C. pedunculata R. Br., and C. rubella Lindl. Bakhuizen van den Brink (1921) reduces it to synonymy under what he calls C. cuspidata Roxb. (which I regard as C. pedunculata R. Br.), but this is manifestly incorrect.

Material of C. pilosissima has been misidentified and distributed in herbaria under the names C. cuspidata Roxb., C. longifolia Lam., and C. rubella Lindl. On the other hand, the Kanehira & Suzuki s.n. [Herb. Nat. Taiwan Univ. 21012], Keng s.n. [Kangu, Oct. 26, 1950], Simada 5207, Tanaka & Shimada 13419, and E. H. Wilson 9649 & 11088, distributed and cited by some authors as typical C. pilosissima, are all actually var. henryi Yamamoto.

In all, 20 herbarium specimens of the typical form of this species have been examined by me.

Citations: FORMOSA: Gressitt 247 (S); A. Henry 267 (N); Oldham 387 (S--isotype); E. H. Wilson 11088 (Ph). GREATER SUNDA ISLANDS: Celebes: Bish 69 (Bz--17529); Bloembergen 4165 (Bz--17527); T. Kaudern 424 (S); W. Kaudern 313 (S); Kjellberg 3889 (S), 3890 (Bz--17528, S); Pijl 775 (Bz--17526); Rachmat 206 (Bz--17532, Bz--17533), 388 (Bz--17534), 994 (Bz--17530, Bz--17531). Sumatra: Bünnemeijer 5646 (Bz--17558, Bz--17559, Ut--58350).

CALLICARPA PILOSISSIMA var. HENRYI Yamamoto, Journ. Soc. Trop.

Agr. Formos. 6: 554--555. 1934.

Bibliography: Yamamoto, Journ. Soc. Trop. Agr. Formos. 6: 554--555. 1934; Moldenke, Bol. Soc. Venez. Cienc. Nat. 11: 49. 1947; Moldenke, Phytologia 3: 139. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133 & 177. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 4. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 280, 292, & 311. 1951; Moldenke, Phytologia 4: 75. 1952; Moldenke, Résumé 168, 172, & 444. 1959.

Yamamoto's original (1934) description of this variety is "*Callicarpa sp. nov. in Sched. Herb. Bort. Bot. Nov. Eborac. Ramus tenuiter, ubique villosus. Folia petiolata, elongato- vel lineari-lanceolata, 15--22 cm longa, 2.5--3.5 cm lata, apice sensim lineari-acuminata vel longe caudata et ad summum obtusa, basi obtusissima vel rotundata raro subcordata, margine minute serrata, supra pagina plus minusve purpurascens, subtus pallida, utrinque pubescentia, supra ad costam et venas dense villosissima; petiolis brevibus 5 mm longis ubique villosissimis. Cymae divericatae, pedunculis petiolo triplo superantibus molliter hirsutis."

The type of the variety was collected by Augustine Henry (no. 120) at Bankinsing, Formosa, and is deposited in the Britton Herbarium at the New York Botanical Garden. Yamamoto (1934) cites also Yamamoto 2366 from Mount Rugatsuzan and comments that "This variety differs from the species in having thinner longer petioled leaves which are not as densely pubescent as the form Maximowicz described". He records the vernacular name "usuba-murasakishikibu".

Recent collectors describe this plant as a semi-woody bush, 2-5 m. tall, the stems to 7 cm. in diameter, the corollas pale-purple (Gressitt 247), pink (Lau 20149), or pinkish (Keng s.n.), and the fruit purple [or white?]. It has been found in flower in February, June, July, and October, and in fruit in January, June, October, and November, at 550 m. altitude, inhabiting roadsides. Wilson reports it as "common" or "abundant in forests" on Formosa. Vernacular names are the one previously mentioned and "mai tap kong".

Chang (1951) cites only the type collection, A. Henry 120. Gressitt makes the very ambiguous statement "fruit purple, white" -- exactly what he means by this is not clear.

Material of this variety has often been misidentified and distributed in herbaria as typical C. pilosissima Maxim. or under the cheironymous misspelling "C. pilossissima Maxim."

In all, 17 herbarium specimens, including the type collection, and one mounted photograph of this variety have been examined by me.

Citations: CHINA: Kwangtung: Lau 20149 (Bz--18594, N). FORMOSA: Gressitt 247 (N); A. Henry 120 (N--isotype); Kanehira & Suzuki s.n. [Herb. Nat. Taiwan Univ. 21012] (W--photo); H. Keng s. n. [Kangu, Oct. 26, 1950] (W--2036069); Simada 5207 (Ca--345487); Tanaka & Shimada 13419 (B, Ca--517688, Go, La, Mi, N, S, W--1579780); E. H. Wilson 9649 (W--1052829), 11088 (W--1092614); Yamamoto 2366 (N).

CALLICARPA PLATYPHYLLA Merr., Philip. Bur. Govt. Lab. Bull. 29: 57--58. 1905.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 13: 57--58. 1918; E. D. Merr., Enum. Philip. Flow. Pl. 3: 387. 1923; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 177. 1949; Moldenke, Résumé 183 & 444. 1959.

Merrill's original (1918) description of this species is as follows: "A tree about 8 m. high, the branches 1 cm. in diameter or less, glabrous, somewhat 4-angled, the branchlets densely puberulent with pale dirty brown indumentum. Leaves subcoriaceous, oblong-elliptic or obovate-elliptic, entire, slenderly subcaudate-acuminate, base acute, 35 to 50 cm. long, 18 to 20 cm. wide, the upper surface glabrous, olivaceous, shining, the lower very densely covered with minute matted, pale, puberulent hairs, the individual hairs not evident under an ordinary lens; lateral nerves about 12 on each side of the midrib, very prominent on the lower surface as are the subparallel primary reticulations, curved, anastomosing; petioles stout, densely puberulent, angled, 4 to 5 cm. long. Cymes axillary, peduncled, rather densely stellate-pubescent with pale hairs, dichotomous, about 7 cm long and 9 cm wide, the bracts linear-lanceolate, 4 to 5 mm long, the bracteoles numerous, similar to the bracts but about 1 mm long. Calyx truncate, cup-shaped, 3 mm in diameter, glabrous or nearly

so. Fruits globose, about 3.5 mm in diameter."

The species is based on Philip. Forest. Bur. 26967, collected by José Maria Velasco in forests, at about 50 meters altitude, at Pamplona, Cagayan Province, Luzon, Philippines, on August 9, 1917, and was deposited in the herbarium of the Philippine Bureau of Science at Manila before its destruction during World War II. Merrill comments that this is "A most remarkable species, well characterized by its very large, entire, slenderly acuminate leaves, which are glabrous above and densely matted puberulent on the lower surface with a pale-brownish, shining non-stellate indumentum; glands, if present, are entirely obscured by the indumentum."

So far I have seen only one herbarium specimen and 2 mounted photographs of this species.

Citations: PHILIPPINE ISLANDS: Luzon: Edaño s.n. [Herb. Philip. Bur. Sci. 79528] (Bz--18595, N--photo, Z--photo).

CALLICARPA PLUMOSA Quisumb. & Merr., Philip. Journ. Sci. 37: 196--197. 1928.

Synonymy: Callicarpa plumosa Merr. & Quisumb. ex Moldenke, Résumé Suppl. 3: 30, in syn. 1962.

Bibliography: E. D. Merr., Philip. Journ. Sci. 37: 196--197. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 173. 1949; Moldenke, Résumé 183 & 444. 1959; Moldenke, Résumé Suppl. 3: 19, 21, & 30. 1962; Moldenke, Phytologia 14: 179. 1966.

Merrill's original (1928) description of this species in its English version is as follows: "A shrub about 2 m high; the branchlets and the lower surface of the leaves densely stellate-tomentose with rather soft, plumose and stellate hairs; branches terete or somewhat compressed at the nodes, pale grayish, the plumose indumentum castaneous. Leaves subcoriaceous, lanceolate, 21 to 34 cm long, 6 to 10 cm wide, entire, narrowed upward to the more or less falcate apex, acutely acuminate, base acute, the upper surface green, smooth, glabrous, the lower surface densely pale stellate-pubescent, not at all glandular, the indumentum on the midrib and nerves plumose, more or less castaneous; lateral nerves distant, 9 or 10 on each side of the midrib, very prominent, curved, the reticulations distinct; petioles densely tomentose, 2 to 3 cm long. Cymes axillary, many-flowered, dichotomous, very densely castaneous-plumose-tomentose, pedunculate, 3.5 to 5.5 cm long; flowers somewhat crowded, their pedicels 0.5 to 1 mm long; calyx membranaceous, cup-shaped, shortly 4-lobed, densely stellate-plumose, 1.5 to 1.75 mm long and 1.5 to 1.75 cm in diameter; corolla membranaceous, 4-lobed, 3.5 to 3.75 mm long, the lobes 0.75 mm long, about 1 mm wide, oblong-ovate, subacute; stamens 4, exserted, 5.5 to 6 mm long; anthers oblong, about 1.25 mm long; the filaments very slender; style very slender, about 6 mm long. Fruit globose, glabrous, about 2.5 mm in diameter, surrounded for about two-thirds of its length by the calyx."

The type of this species was collected by Maximo Ramos and Gregorio E. Edaño along forested streams, at about 400 meters altitude, at San Mariano, in Isabela Province, Luzon, Philippine Islands, and is Philip. Bur. Sci. 46928, deposited in the herbarium of the Philippine Bureau of Science at Manila, now destroyed. Merrill comments (1928): "A species characterized by its lanceolate, entire leaves, which are green and glabrous above and densely pale stellate-pubescent beneath, the indumentum on its branchlets, and inflorescences being plumose and castaneous."

Recent collectors describe the plant as 2 m. tall, the stems 4--6 cm. in diameter, the corollas yellow [Herb. Philip. Bur. Sci. 46928], the stamens whitish-blue [Herb. Philip. Bur. Sci. 47121], the pollen yellow, and the fruit violet. It has been found growing in secondary forests at low altitudes and along forest streams, to 400 m. altitude, flowering in February, March, and August, and fruiting in February. Material has been misidentified and distributed in herbaria as C. erioclona Schau.

In all, 10 herbarium specimens, including the type collection, and 2 mounted photographs of this species have been examined by me.

Citations: INDOCHINA: Cochinchina: Pierre 5227 (Ca--54670). PHILIPPINE ISLANDS: Luzon: M. K. Clemens 16799 (Ca--285401); Haenke 81 (Ca--280934); Loher 12347 (Ca--229196, Ca--243060); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 46928] (B--isotype, Bz--17576--isotype, Ca--329894--isotype, N--isotype, N--photo of isotype, Z--photo of isotype), s.n. [Herb. Philip. Bur. Sci. 47121] (Ca--309746).

CALLICARPA POILANEI Dop, Bull. Soc. Hist. Nat. Toulouse 64: 502--503. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 502--503, 511, & 512. 1932; P. Dop in Lecomte, Fl. Gén. Indo-Chine 4: 787. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 412 & 413. 1938; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 59 & 87. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 77. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136, 137, & 178. 1949; Moldenke, Phytologia 3: 380. 1950; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Moldenke, Résumé 175, 177, & 444. 1959; Anon., Kew Bull. Gen. Index 1929-1956, 59. 1959.

Dop (1932) describes this plant as follows: "Frutex vel arbor 5--6 m. altus. Ramuli subquadrangulares tenuiter ferrugineo tomentoso stellato obtecti. Folia paullo coriacea, elliptico-oblonga, basi acuta et paullo decurrentia, obtusa vel acuta et abrupte acuminato-caudata apice, sinuato-denticulata vel sinuato-dentata, supra sparse pubescentia pilis stellatis in juventute, adulta glabra et brunnea in sicco, subtus tenuissimo tomento apprimo griseo vel albido et nonnullis pilis stellatis erectis obtecta, 20--28 cm. longa x 5--7,5 cm. lata; nervus gracilis, teres,

subtus valde prominens; costae 18—22, primum rectilineares, deinde abrupte recurvatae et ascendentes; venae subparalleles; reticulationes conspicuae; petiola 18—25 mm. longa, cum crista prominente conjuncta. Inflorescentiae: cymae stellato-pubescentes, dichotomiae, multiflorae, 2—3 cm. longae et latae; bractae minimae; pedunculi 8—10 mm. longi; pedicelli 1 mm. longi; flores 4 mm. longi. — Calyx truncatus, valde stellato-tomentosus, 2 mm. longus, dentibus 4 minutissimis. Corolla basi valde coarctata deinde late dilatata, extus valde stellato-tomentosa, 4 mm. longa; tubus amplus, 3 mm. longus; lobi 4 rotundati, 1 mm. longi. Stamina 4; filamenta corollam aequantia et basi inserta; antherae exsertae, valde dorsum glandulosae. Ovarium fere glabrum, glandulosum; stylus stamina aequans; stigma capitatum. — Fructus: drupa nigra, glabra, 3 mm. lata."

The species is based on Poilane 8265 from Annam, Chevalier 31781, Harmand s.n., and Poilane 17611 from Cambodia, Pierre 5226 from Cochinchina, and Pierre s.n. from Thailand. Dop (1932) comments that "Cette espèce est très voisine du C. angustifolia King et Gamble.....dont elle se rapproche par la crête inter-œtiolaire. La structure de la fleur est la même, avec cependant une différence importante. Dans C. Poilanei l'ovaire est presque glabre, tandis qu'il est villosus dans l'espèce de King et Gamble. Des différences plus facilement visibles s'accusent dans la forme des feuilles et leur revêtement. Dans mon espèce les feuilles sont elliptiques-oblongues et non lancéolées, aiguës et non longuement atténuées à la base, brusquement acuminées-caudées et non aiguës-atténuées au sommet. Presque entières dans l'espèce de King et Gamble les feuilles de C. Poilanei sont sinuées-denticulées et même abondamment sinuées-dentées. Enfin le tomentum de la face inférieure est beaucoup plus fin que dans C. angustifolia."

In all, 9 herbarium specimens of this species, including cotype collections, have been examined by me.

Citations: THAILAND: Pierre s.n. [Luang, 8/1868] (B--cotype, N--cotype, S--cotype). INDOCHINA: Cambodia: Poilane 17611 (W--2496741--cotype). Cochinchina: Pierre 5226 (B--cotype, Ca--38112--cotype, Ca--54655--cotype), s.n. [on montibus Dinh] (B). Tonkin: Pételot 6922 (N).

CALLICARPA PRINGLEI Briq., Bull. Herb. Boiss., sér. 1, 4: 345—346. 1896.

Synonymy: Callicarpa americana Sessé & Moc., Pl. Nou. Hisp. 2: 18. 1893 [not C. americana Blanco, 1884, nor Hort., 1936, nor L., 1753, nor Lam., 1966, nor Lour., 1794, nor Roxb., 1945, nor Thunb., 1926, nor Willd., 1820]. Callicarpa pringlei Briq. ex Moldenke, Suppl. List Invalid Names 2, in syn. 1941. Callicarpa pringlei Briq. ex H. N. & A. L. Moldenke, Pl. Life 2: 77, sphalm. 1948.

Bibliography: Sessé & Moc., Pl. Nou. Hisp. 2: 18. 1893; Briq.,

Bull. Herb. Boiss., sér. 1, 4: 345--346 & 924. 1896; Thiselet.-Dyer, Ind. Kew. Suppl. 2: 32. 1904; P. C. Standl., Contrib. U. S. Nat. Herb. 23: 1253. 1924; Moldenke in Fedde, Repert. Sp. Nov. 39: 301 (1936) and 40: 43--45, 57, 120, 123, 127, 128, & 130. 1936; Moldenke, Geogr. Distrib. Avicenn. 13. 1939; Moldenke, Prelim. Alph. List Invalid Names 9. 1940; Moldenke, Carnegie Inst. Wash. Publ. 522: 198--200. 1940; Moldenke, Suppl. List Invalid Names 2. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 16 & 87. 1942; Moldenke, Alph. List Invalid Names 8 & 10. 1942; Moldenke, Alph. List Cit. 1: 227, 229, 301, 302, 306, 307, 311, & 316. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 77. 1948; Moldenke, Castanea 13: 114. 1948; Moldenke, Alph. List Cit. 2: 339, 418, 421, 426, 435, & 467 (1948), 3: 656, 785, 786, 807, 829, & 925 (1949), and 4: 1019, 1026, 1028, 1053, & 1111. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 28, 34, & 178. 1949; Moldenke, Phytologia 3: 451. 1951; Moldenke, Résumé 34, 40, 241, 246, & 444. 1959; Langman, Select. Guide Lit. Flow. Pl. Mex. 1010. 1964; Moldenke, Résumé Suppl. 13: 6. 1966; Moldenke, Phytologia 14: 433, 434, 439, 475, & 476 (1966), 14: 107, 111, & 191 (1966), and 16: 367. 1968; Marroquin, Cuad. Inst. Invest. Cient. 14: 13. 1968; Moldenke, Phytologia 20: 488 (1971) and 21: 50, 102, & 385. 1971; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

Detailed descriptions and discussions of this species have been given by me in previous publications. Recent collectors describe it as a large shrub, 5 m. tall, with white corollas [Moore 3392, Pennell 17918], growing in mixed woods, low tropical woods, tropical forests, and on rocky limestone areas, at altitudes of 50 to 1200 meters. They have found it in flower from June to August and in fruit in June and August.

Standley (1924) distinguishes it from the very closely related and perhaps conspecific C. acuminata H.B.K. as follows:

Leaves persistently but minutely stellate-pubescent on the upper surface.....C. acuminata.
Leaves glabrous on the upper surface except when very young.....C. pringlei.

As I have stated in previous publications, it is probable that Briquet's plant deserves no more than varietal or form status under C. acuminata, since so many intermediate specimens exist. Gaumer, in fact, suggested "C. acuminata H.B.K. form?" on the labels of one of his collections.

The type of C. americana Sessé & Moc. is Sessé, Mociffo, Castillo, & Maldonado 519 [ic. no. 293], deposited in the Madrid herbarium.

It should be pointed out here that the C. americana of Linnaeus, referred to in the synonymy above, is a valid species, with the homonyms attributed to Lamarck, to Roxburgh, and to Willdenow as synonyms, while the C. americana of Blanco is C. formosana Rolfe, that of Loureiro is C. candicans (Burm. f.) Hochr., that attributed to Thunberg is C. japonica Thunb., and that attributed to horticultural origin is C. longifolia Lam.

The Arrington s.n. [27.IX.1964], H. E. Moore 3392, and Rzedowski 10345 & 10689a, distributed as C. pringlei, are all better placed in typical C. acuminata H.B.K.

In all, 78 herbarium specimens of C. pringlei, including the type collection, and 36 mounted photographs have been examined by me.

Additional & emended citations: MEXICO: San Luis Potosí: Kenoyer s.n. [Valles, 8-39] (Mi); LeSueur 425 (Au); Edw. Palmer 123 (Ca--148594), 251 (Cm, Me, Mi, Mi--photo); F. W. Pennell 17918 (Me, N, N, W--1640841); Pringle 3094 (Br--isotype, Ca--104992--isotype, Cm--isotype, Ed--isotype, Me--isotype, Me--isotype, Mm--15348--isotype, Ms--30944--isotype, Mu--1738--isotype, Ob--50625--isotype, P--isotype, Pa--isotype, Po--63852--isotype, Vt--isotype, Vu--isotype); J. Rzedowski 7766 (Ip). Yucatán: Gaumer & sons 23886 (Us). State undetermined: Kenoyer & Crum 3622 [Ocampo] (Mi); Sessé, Mocino, Castillo, & Maldonado 519 [Patzahumacachi, El Espinal; ic. no. 293] (E--photo, F--850366, N--photo, Q, Z--photo).

CALLICARPA PSEUDORUBELLA Chang, Act. Phytotax. Sin. 1: 287--288. 1951.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 271, 279, 287--288, & 311. 1951; G. Taylor, Ind. Kew. Suppl. 13: 21. 1966; Moldenke, Résumé Suppl. 14: 3. 1966.

Shrub, 1 m. tall; branchlets terete, the youngest ones stellate-pubescent, the older ones sparsely puberulent; internodes 2--2.5 cm. long; leaves manifestly petiolate; petioles 3--5 mm. long, stellate-pubescent; leaf-blades oblong or elliptic-oblong, 4--5.5 cm. long, 1.5--2 cm. wide, acute at the apex, crenate-serrulate along the upper 3/4 of the margins, subrounded to obtuse at the base, yellow-punctate on both surfaces, green and puberulent above, paler and sparsely pubescent beneath, stellate-pubescent along the midrib and secondaries, the midrib and the 5 or 6 secondaries per side obscure above and prominent beneath; cymes 1.5 cm. in diameter, 3 times dichotomous; peduncles thick, 8--10 mm. long, stellate-pubescent; bractlets subulate, 2.5 mm. long; calyx 1 mm. long, minutely puberulent with simple hairs, its teeth inconspicuous; corolla rose-purple, minutely puberulent like the calyx, its tube 1.5 mm. long, the lobes broadly ovate, 0.7 mm. long; stamens exserted; filaments 3 mm. long; anthers 0.8 mm. long, punctate, longitudinally dehiscent; ovary glabrous or sparsely punctate; style 5 mm. long; fruit 2 mm. in diameter.

This species was based by Chang on S. Y. Lau 20149, collected at Canton, Kwangtung, China, in 1932, and deposited in the herbarium of the Botanical Institute of Suryatsen University in Canton. He compares the species with C. rubella f. crenata P'ei and C. dichotoma (Lour.) K. Koch, but, unfortunately only in Chinese characters and apparently cites no other material. It

is known to me only from his original description.

CALLICARPA PSILOCALYX C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 569—570. 1885.

Synonymy: *Callicarpa pilocalyx* Clark ex Li, Woody Fl. Taiwan 821, sphalm. 1963.

Bibliography: C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 569—570. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Gamble, Man. Indian Timb., ed. 2, 525. 1902; Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 220. 1911; Rehd. in C. S. Sarg., Fl. Wils. 3: 367. 1916; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; Fletcher, Kew Bull. Misc. Inf. 1938: 412 & 415. 1938; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 54, 55, 59, & 87. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 128, 137, & 178. 1949; Annon., Kew Bull. Gen. Index 1929—1956, 59. 1959; Moldenke, Résumé 160, 165, 177, & 444. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Deb, Bull. Bot. Surv. India 3: 314. 1961; Li, Woody Fl. Taiwan 821. 1963; Moldenke, Résumé Suppl. 8: 3. 1964; Moldenke, Phytologia 14: 57 & 142 (1966) and 16: 373. 1968; Moldenke, Résumé Suppl. 16: 9. 1968; Moldenke, Phytologia 21: 101, 102, & 108. 1971.

Clarke's original (1885) description of this plant is "arborescent, leaves elliptic acuminate denticulate mature nearly glabrous, cymes small short-peduncled stellately villous, calyx membranous in flower glandular scarcely hairy. Khasia Mts., alt. 4-5000 ft.; Wallich, J. D. H., &c. A small tree; branchlets densely stellate-tomentose. Leaves 8 by 2 3/4 in., or 2 1/2 by 1 in., base rounded or cuneate thinly membranous, mature with scattered stellate hairs on the midrib beneath, tertiary venation close prominent, glands minute scattered; petiole 1/8 — 1/4 in. Peduncles mostly very short; cymes usually few-fl.; pedicels sometimes pink. Calyx 1/24 in., minutely 4-toothed, greenish or pinkish minutely gland-dotted, with a few scattered hairs when young whitish or membranous in fruit. Corolla pink. Fruit scarcely 1/12 in. diam. — *C. longifolia* Benth, Fl. Hongk. 270 (not of Lamk.), in the glabrous calyx, inflorescence, and structure of leaves comes very near this; but in that the leaves are linear-lanceolate, and the fruit very much larger."

Benthams plant, referred to above, is now regarded as being *C. longissima* (Hemsl.) Merr.

Recent collectors describe *C. psilocalyx* as a straggling shrub or small tree, about 2 m. tall, the corollas pink-violet or purple. They have found it growing in wet evergreen forests, at altitudes of 400—600 meters, flowering in May and August, fruiting in August. Smitinand describes it as "common in evergreen jungles" in Thailand. Deb (1961) records it from Manipur, India. The corolla is described as "purple" on Smitinand 4837 and as "pink-violet" on Larsen, Santisuk, & Warncke 3232.

Rehder (1916) asserts that C. psilocalyx is related to C. bodinieri var. giraldii (Hesse) Rehd., differing from that taxon "chiefly in its densely pubescent branchlets, in its long-acuminate leaves usually obtuse or rounded at the base, shorter petioles, smaller inflorescences, and in the filaments scarcely exceeding the corolla-lobes". Bakhuisen van den Brink (1921) reduces it to what he calls C. cuspidata Roxb., while Fletcher (1938) cites "C. cuspidata Roxb., in part" as a synonym of C. psilocalyx!

The Mrs. D. J. Collins 1667, distributed as C. psilocalyx, is actually C. longifolia Lam.

In all, 4 herbarium specimens of C. psilocalyx have been examined by me.

Citations: THAILAND: Dee 1009 [Herb. Roy. Forest Dept. 23036] (Z); Larsen, Santisuk, & Warncke 3232 (Ac), 3236 (Ac); Smitinand 4837 (N).

CALLICARPA RAMIFLORA Merr., Philip. Journ. Sci. Bot. 3: 262—263. 1908.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 3: 262—263 (1908) and 7: 339. 1912; Prain, Ind. Kew. Suppl. 4, pr. 1, 34. 1913; H. J. Lam, Verbenac. Mal. Arch. 47, 62—63, 83, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 11. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 387. 1923; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 62 & 87 (1942) and [ed. 2], 141 & 178. 1949; Prain, Ind. Kew. Suppl. 4, pr. 2, 34. 1958; Moldenke, Résumé 183 & 444. 1959; Moldenke, Phytologia 14: 145 (1966) and 16: 366. 1968; Van Steenis, Blumea 15: 151. 1969.

A small tree, 4—5 m. tall; trunk 4—5 cm. in diameter at breast height; branches stout, terete, gray, glabrate; branchlets ferruginous-floccose or -hirsute; leaves opposite, petiolate; petioles 1—3.5 cm. long, ferruginous-floccose or very densely ferruginous-hirsute; leaf-blades subchartaceous or subcoriaceous, elliptic-ovate or oblong-elliptic to broadly ovate or rotundate, about 30 cm. long, 15—20 cm. wide, somewhat abruptly short-acuminate at the apex, crenate-denticulate or obscurely denticulate along the margins except near the base, acute or rounded at the base, glabrous above when mature except for the ferruginous-pubescent midrib and larger venation, more or less densely stellate-tomentose beneath; secondaries 12—14 per side, prominent beneath; veinlet reticulation very distinct; cymes small, fasciculate, congested, (pseudo-)cauliflorous, in the axils of the branchlets or of fallen leaves on older branches, 1—1.5 cm. long, ferruginous-floccose or densely hirsute; peduncles 3 mm. long; calyx subtubular, 4 mm. long, densely hairy with simple hairs or stellate-villous, glandulose, somewhat scaly, its rim 4-toothed; corolla pinkish-blue or white, its tube 5 mm. long, glabrous below, the upper portion and the lobes densely hairy and glandulose with simple hairs, the lobes 4, oblong, 2 mm. long, obtuse at the apex; stamens 4, yellow; filaments 4 mm. long; anthers 2 mm. long, glandular-dotted; style 6 mm. long; stigma capitate, distinctly

4-lobed; drupes "green" [when immature], produced on the trunk up to the branches.

This species is based on Mrs. Clemens 1167 from Camp Keithley, Lake Lanzo, Mindanao, Philippine Islands, collected in September, 1907, and s.n. collected at the same locality in July, 1907, both deposited in the herbarium of the Philippine Bureau of Science at Manila, but now unfortunately destroyed. Merrill (1908) comments that this is "A species well characterized by its large leaves, and fascicled, congested, short cymes which are from the branches below the leaves."

Lam (1919) cites M. Ramos 15278 from Dagana, Leyte, Philippine Islands, and states that the species grows also on Mindanao. He asserts that it is related to C. cauliflora Merr., which he distinguishes in his key by its leaf-blades being acute or cuneate to attenuate at the base. Bakhuizen van den Brink (1921) reduces C. ramiflora to the synonymy of what he calls C. pentandra var. typica f. hexandra Bakh. [now known as Geunsia hexandra (Teijsm. & Binn.) Koord.], under which name specimens have been misidentified and distributed in herbaria.

Callicarpa ramiflora has been found growing along forest streams, at an altitude of 1000 meters, flowering in August, and fruiting in November and December. The fruits mounted in a separate packet on Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 75343] in the herbarium of the University of California at Berkeley may not belong to this plant; the corollas of this collection are described as "pinkish-blue", but Lam (1919) avers that in the species under discussion here they are "white".

The M. Ramos s.n. [Herb. Philip. Bur. Sci. 41540], cited under C. cauliflora Merr. in the present series of notes, bears a striking resemblance to C. ramiflora.

In all, 6 herbarium specimens of C. ramiflora have been examined by me.

Citations: PHILIPPINE ISLANDS: Catanduanes: M. Ramos s.n. [Herb. Philip. Bur. Sci. 30275] (Bz--18556, W--1290074); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 75343] (Bz--18553, Ca--449130, N, Ut--6241a).

CALLICARPA RANDAIENSIS Hayata ex Kawakami, List Pl. Formos. 84, hyponym. 1910; Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 222--223. 1911.

Synonymy: Callicarpa parvifolia Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): 222. 1911 [not C. parvifolia Hook. & Arn., 1838]. Callicarpa parviflora Hayata apud Li, Woody Fl. Taiwan 823, sphalm. 1963.

Bibliography: Kawakami, List Pl. Formos. 84. 1910; Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 222--223. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 530. 1912; Hayata, Icon. Pl. Formos. 2: 126, pl. 37 & 38. 1912; Prain, Ind. Kew.

Suppl. 5, pr. 1, 43. 1921; Nakai, Bot. Mag. Tokyo 36: 23. 1922; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 605 (1927) and ed. 2, 605. 1928; S. Sasaki, List Pl. Formos. 350. 1928; Stapf, Icon. Bot. Ind. Lond. 1: 526. 1929; L. H. Bailey, Cat. Florists Handl. Verbenac. n.p. 1935; Kanehira, Formos. Trees, ed. 2, 646—647 & 716, fig. 603. 1936; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 57 & 87 (1942) and [ed. 2], 133 & 178. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 280, 294, & 311. 1951; Moldenke, Résumé 172, 245, & 444. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Moldenke, Phytologia 8: 57. 1961; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1209 & 1211, pl. 1017 & 1019. 1962; Moldenke, Résumé Suppl. 3: 18. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Hocking, Excerpt. Bot. A.5: 45. 1962; Li, Woody Fl. Taiwan 823. 1963; Moldenke, Phytologia 14: 167. 1966; Moldenke, Résumé Suppl. 14: 3 & 4 (1966) and 15: 17. 1967; Moldenke, Phytologia 15: 39 (1967) and 21: 213 & 333. 1971.

Illustrations: Hayata, Icon. Pl. Formos. 2: pl. 37 & 38. 1912; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 605 (1927) and ed. 2, 605. 1928; Kanehira, Formos. Trees, ed. 2, 647, fig. 603. 1936; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: pl. 1017 & 1019. 1962.

Bush or shrub, 2—3.5 m. tall; trunk to about 1.25 cm. in diameter; branches whitish-gray or reddish-gray, slender, glabrous or subglabrous, lenticellate; branches slender, divaricate, stellate-tomentose or very short-pubescent; lenticels elevated; leaves opposite, petiolate, exstipulate, the young ones stellate-tomentose; petioles 3—10 mm. long, very short-tomentose; leaf-blades oblong-lanceolate, 4.5—10 cm. long, 1—3 cm. wide, acuminate at the apex, obtuse or acute at the base, serrate or serrulate with apiculate teeth along the margins except toward the entire apex and base, darkened above in drying, glabrate on both surfaces except for the very short-pubescent or stellate-tomentose midrib and larger veins, paler beneath and very sparsely stellate-pilose or short-pubescent, glandulose with minute shiny yellow punctiform glands on the lamina and with scattered minute impressed glands near the base and midrib; cymes axillary, about twice as long as the subtending petiole, few-branched, the branches short and divaricate; peduncles about 1.5 cm. long; bractlets narrow, subulate, rather thick, minute, about 1.5 mm long; pedicels 1—2 mm. long; calyx campanulate or campanulate-cupuliform, 1.5—2 mm. long, glandular-pulverulent externally, the rim irregularly and broadly triangular-dentate to 3- or 4-lobed, the teeth or lobes obtuse or acute at the apex; corolla pink or purple, to 5.5 mm. long, tubular-campanulate, glandular-pulverulent and yellow-dotted on the outside or glabrous, the tube about 4 mm. long and 2.5 mm. wide, the limb 5-lobed, the lobes about 1.5 mm. long, spreading, rounded; stamens 4, about 7 mm. long, attached at the base of the corolla-tube; filaments

filiform, about 6.5 mm. long; anthers oblong, about 2 mm. long and 1 mm. wide, truncate at the apex, sagittate at the base; style dilated above, filiform, about 8 mm. long; stigma dilated, broadly 2-fid or 2-lobed; ovary globose or ovoid, about 1.5 mm. long, attenuate at the apex, densely yellow-dotted; fruit at first green, later purple or violet, round.

This species is based on U. Mori 7023 from Randaizan, Formosa, collected in August, 1908, while C. parvifolia Hayata is based on Kawakami & Mori 2879 from Daimari, Taitō, Formosa. The species has been found growing in thickets and forests and on mountain-tops, at altitudes of 1165 to 2600 meters, flowering in June, July, and September, and fruiting in July, September, October, and December. Vernacular names recorded for it are "Luanta beauty-berry", "randai-murasaki", and "small-leaved beauty-berry". Hayata (1911) says that it is "near Callicarpa japonica Thunb., from which the present plant differs in having lanceolate leaves. Also near C. gracilis Sieb. et Zucc. and C. elegans Hayek, but differs from the former by the more conspicuously serrulate leaves, and from the latter, in having less acuminate, more hairy, leaves and larger flowers."

Nakai (1922) is of the opinion that "Callicarpa parvifolia is a young branch of C. randaiensis having still folding leaves and very young flower-buds. This species is very closely related to C. japonica, only differing by the slenderer stalks and narrower leaves."

Bailey (1935) states that C. randaiensis is offered to the horticultural trade by a nurseryman in Taihoku.

Hui-Lin Li (1963) reduces the species to synonymy under C. japonica var. angustata Rehd., saying "The reduction of C. randaiensis Hayata is made on the basis of the type and the original description. Callicarpa parviflora Hayata has been previously reduced to the synonymy of C. randaiensis by Kanehira." He cites H. H. Bartlett 6053, Faurie 394 & s.n., Gressitt 315, Hayata & Mori 7023 (which he says is the type collection), Kanehira 2878, Kawakami & Mori 2878 & 2879, Matuda 197 & s.n., Suzuki 6986 & s.n., and E. H. Wilson 10848. Chang (1951) cites nos. 3047 & 72751 from Formosa, but the collectors and/or herbarium names are, unfortunately, given only in Chinese characters. He compares the species with C. dichotoma (Lour.) K. Koch, but, again, only in Chinese. He erroneously cites C. parvifolia Hook. & Arn. to "Bot. Beechey's Voy. 295. 1836", but this binomial was actually published on page 305 of that work and the date of publication of the part containing that page is 1838.

The corollas of C. randaiensis are described as "pink" on Gressitt 315 and as "purple" on Gressitt 374. Material of the species has been misidentified and distributed in herbaria under the names C. dichotoma (Lour.) K. Koch and C. longifolia longissima Hemsl. The H. H. Bartlett 6082 collection, in fact, was

originally distributed as C. longifolia longissima Hemsl., then "corrected" to C. longissima (Hemsl.) Merr., and then to C. longifolia f. floccosa Schau.

In all, 19 herbarium specimens and 1 mounted photograph of C. randaiensis have been examined by me.

Citations: CHINA: Kwangtung: C. O. Levine s.n. [Herb. Canton Chr. Coll. 743] (W—779015). FORMOSA: H. H. Bartlett 6053 (M1, N, W—1248412), 6082 (M1, W—1248439); Gressitt 315 (N, S), 349 (N), 374 (N); Huang 1812 (Lb—48288); Kanehira 2878 (N, W—1671955); Kao 4176 (M1); Kawakami & Mori 7023 (W—photo); Matuda 286 (Ca—345486); Ohwi 3533 (Ba); E. H. Wilson 10108 (W—1052933, W—1052934), 19848 (W—1053031).

CALLICARPA RANDAIENSIS var. KOREANA Moldenke, Phytologia 8: 57. 1961.

Bibliography: Moldenke, Phytologia 8: 57. 1961; Moldenke, Résumé Suppl. 3: 18. 1962; Hocking, Excerpt. Bot. A. 5: 45. 1962; Moldenke, Biol. Abstr. 37: 1062. 1962; Moldenke, Phytologia 14: 167. 1966.

This variety differs from the typical form of the species in having its leaves thin-membranous, very small, 2—4.5 cm. long, 7—14 mm. wide, narrowly elliptic, long-acuminate at the apex, cuneate-acuminate at the base, finely appressed-serrulate from below the middle to the base of the terminal acumination, and glabrous on both surfaces.

The type of the variety was collected by Hyon Pia Chong at Wan-Do, Korea, on October 29, 1950, and is deposited in the herbarium of the University of California at Berkeley. The Korean vernacular name for the plant is said to be "chhom-chaksal-namu". The type collection was originally misidentified and distributed as C. dichotoma (Lour.) K. Koch.

In all, only 2 herbarium specimens, including the type, have been seen by me of this variety.

Citations: KOREA: Chong s.n. [Wan-Do, 29th October 1950] (Ca—998287—type, Z—isotype).

CALLICARPA REMOTISERRULATA Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 223—224. 1911.

Synonymy: Callicarpa remotiserrata Hayata apud J. Matsum., Ind. Pl. Jap. 2 (2): 530, sphalm. 1912. Callicarpa remotiserrulata Chang, Act. Phytotax. Sin. 1: 270, sphalm. 1951. Callicarpa remotiflora Lin & Wang, Bot. Bull. Acad. Sin. 8: 185—186, 188, & 190, fig. 3, 4, & 6. 1967.

Bibliography: Hayata, Journ. Coll. Sci. Univ. Tokyo 30 (1): [Mater. Fl. Formos.] 223—224. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 530. 1912; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; T. Itô, Taiwan Shokubutu Dzusetu [Illustr. Formos. Pl.], ed. 1, 7 & 604 (1927) and ed. 2, 7 & 604. 1928; S. Sasaki, List Pl. Formos. 350. 1928; Kanehira, Formos. Trees, ed. 2, 647—648 & 716, fig.

604. 1936; Moldenke, Prelim. Alph. List Invalid Names 12. 1940; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 57 & 87. 1942; Moldenke, Alph. List Cit. 2: 602. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133 & 178. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 300, 307, 311, & 312. 1951; Moldenke, Résumé 172, 246, & 444. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: 1212, pl. 1020. 1962; Li, Woody Fl. Taiwan 818, 819, 823--824, & 944. 1963; Lin & Wang, Bot. Bull. Acad. Sin. 8: 185--186, 188, & 190, fig. 3, 4, & 6. 1967; Moldenke, Résumé Suppl. 17: 8. 1968.

Illustrations: Kanehira, Formos. Trees, ed. 2, 648, fig. 604. 1936; Liu, Illustr. Nat. & Introd. Lign. Pl. Taiwan 2: pl. 1020. 1962; Lin & Wang, Bot. Bull. Acad. Sin. 8: 188 & 190, fig. 3, 4, & 6. 1967.

An erect shrub, to 2 m. tall; branches and branchlets terete, gray to brownish, covered with stellate-tomentose hairs, the branches rugulose with prominent ridges, the branchlets sometimes very sparingly pubescent or glabrate; leaves opposite; petioles about 6 mm. long, sulcate above, very shortly stellate-tomentose; leaf-blades chartaceous, obovate or elliptic to lanceolate or oblong-lanceolate, 4--12 cm. long, 2--3.5 cm. wide, acute to acuminate at the apex, remotely mucronate-serrate along the margins, entire near the apex and base, acuminate or cuneate-attenuate at the base, green above, pale-green beneath, paler on both surfaces in drying or sometimes darkening above, both surfaces glabrous or covered with stellate hairs and very sparsely yellow-punctate, with a larger impressed gland at the base above, the midrib and veins slightly elevated on both surfaces or prominent beneath, the teeth mucronate, about 0.5 mm. long and wide, obtuse at the apex, about 5 mm. apart; secondaries 5--7 pairs, slightly elevated on both surfaces; cymes axillary and terminal, opposite, 2--3 times as long as the subtending petiole; calyx campanulate or campanulate-cupuliform, 2 mm. long, 1.8 mm. wide, covered with dense stellate hairs, the rim irregularly and obscurely 4-toothed; corolla white, tubular, 3.5 mm. long, stellate-hairy on the outside, glabrous inside, the limb 4-lobed, the lobes rounded at the apex; stamens 4, exserted, inserted at the base of the corolla-tube; filaments filiform, 3.5--5 mm. long; anthers oblong, 1.5 mm. long; ovary globose, 1 mm. in diameter; style filiform, 5 mm. long; stigma depressed-capitate; drupes globose, about 6--7 mm. in diameter, purple at maturity, glabrous, with 4 or 5 seeds; seeds flattened, reniform.

The type of C. remotiserrulata is G. Nakahara 619, collected at Botanrosha, Kōshūn, Formosa, in 1906, while that of C. remotiflora is J. L. Wang 5401 from Shouchia, at 460 meters altitude, Formosa, collected in September, 1965. Common names recorded for the plant are "Hengchun beauty-berry", "kōsyun-murasaki", and "Taiwan-murasaki". Kanehira's surname is sometimes misspelled "Kanebira" on some labels.

Chang (1951) cites only a no. 21027 from Formosa, but the col-

lector or herbarium name is, unfortunately, given only in Chinese characters. Li (1963) cites Nakahara 619 and Suzuki 6086 from Formosa; Lin & Wang (1967) cite a C. E. Chang s.n. from the same island.

In all, 2 herbarium specimens and 4 mounted photographs, including a purported phototype, have been examined by me.

Citations: FORMOSA: Kanehira s.n. [Hiran-san, 8.XII.1918] (N--photo, Ph, W--photo, Z--photo); Nakahara 919 [Herb. Govt. Formosa 21025] (W--photo of type); Yamada s.n. [April 1934] (S).

CALLICARPA RESINOSA Wright & Moldenke ex Moldenke in Fedde, Repert. Sp. Nov. 33: 142--143. 1933.

Synonymy: Callicarpa resinosa Wright ex Moldenke in Fedde, Repert. Sp. Nov. 40: 78, in textu. 1936; Alain in León & Alain, Fl. Cuba 4: 306. 1957.

Bibliography: Moldenke in Fedde, Repert. Sp. Nov. 33: 142--143 (1933), 39: 298 (1936), and 40: 56, 57, 73, 75, 77--80, 119, & 131. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87. 1952; Moldenke, Alph. List Cit. 1: 310 (1946), 2: 420 (1948), and 4: 1079, 1144, & 1157. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 42 & 178. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 4. 1950; Alain in León & Alain, Fl. Cuba 4: 304 & 306. 1957; Moldenke, Résumé 50, 246, & 445. 1959.

Collectors have encountered this species in anthesis and fruit in April and November and report the vernacular name "filigrana". José P. Carabia has stated to me personally that it is rather certain that the type collection, previously cited by me as questionably from Oriente, Cuba, actually came from the province of Pinar del Río, on the opposite end of the island. It should also be noted here that I am now of the opinion that this species may actually be the same as what is now passing as C. fulva var. glabrescens Moldenke. More careful comparison of the specimens involved, together with exhaustive field work, is indicated. Material of C. resinosa has been distributed in some herbaria under the tentative designation of "C. ferruginea var."

In all, 22 herbarium specimens of C. resinosa, including the type, and 20 mounted photographs have been examined by me.

Additional & emended citations: CUBA: Oriente: Acuña 12688 (Es, W--1881245). Pinar del Río: C. Wright 3171 [Herb. Sauvalle 1774] (E--119138--isotype, F--photo of isotype, F--244617--isotype, Hv--isotype, Hv--isotype, Hv--isotype, N--photo of isotype, Si--photo of isotype, Z--photo of isotype), 3171a (F--244616).

CALLICARPA RETICULATA Sw., Prodr. 31. 1788.

Synonymy: Callicarpa foliis elliptico-lanceolatis subserratis rugosis subtus tomentos-incanis Sw. ex Willd., Linn. Sp. Pl. 1: 620, in syn. 1797.

Bibliography: Sw., Prodr. 31. 1788; J. F. Gmel. in L., Syst.

Nat., ed. 13, pr. 1, 2: 246 (1789) and pr. 2, 2: 246. 1791; Sw., Fl. Ind. Occ. 1: 252. 1797; Raeusch., Nom. Bot. 37. 1797; Willd., Linn. Sp. Pl. 1: 620. 1797; Pers., Syn. Pl. 1: 133. 1805; Poir. in Lam., Encycl. Méth. Suppl. 2: 33. 1811; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 3: 95—96. 1818; Steud., Nom. Bot., ed. 1, 137. 1821; Roth, Nov. Pl. Sp. 82. 1821; Spreng. in L., Syst. Veg., ed. 16, 1: 420. 1825; Ainslie, Mat. Ind. 2: 181. 1826; Spreng. in L., Syst. Veg., ed. 16, 5: 126. 1828; D. Dietr., Syn. Pl. 1: 429. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Pers., Sp. Pl. 1: 343. 1842; Walp., Repert. 4: 131. 1845; Schau. in A. DC., Prodr. 11: 642. 1847; Sagra, Hist. Cuba 2 (11): 145. 1850; Jacques & Hérincq, Man. Gén. Pl. Arb. & Arbust. [Fl. Gen. Eur. 3:] 502. 1851; Griseb., Fl. Brit. West Ind. 499. 1861; Bocq., Adansonias 3: [Rév. Verbenac.] 192. 1863; Griseb., Cat. Pl. Cub. 216. 1866; Sauvalle, Fl. Cub. 113. 1868; G. W. Johnson, Gard. Dict. 157. 1890; Fawcett, Prov. List Indig. Nat. Flow. Pl. Jamaica 30. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Garcia Caffizares, Fl. Cub. 69. 1901; Urb., Symb. Ant. 5: 485 & 486. 1908; Britton & P. Wils., Scient. Surv. P. R. & Virg. Isls. 6 (1): 147. 1925; Moldenke in Fedde, Repert. Sp. Nov. 39: 299 (1936), 40: 49, 69, 70, 80—83, 120, 130, & 131 (1936), and 42: 238, 242, & 243. 1937; Moldenke, Alph. List Common Vern. Names 23. 1939; Moldenke, Geogr. Distrib. Avicenn. 6. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 25 & 87. 1942; Moldenke, Phytologia 2: 95. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Alph. List Cit. 4: 982 & 1145. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 46 & 178. 1949; Roig y Mesa, Dicc. Bot. 2: 389, 390, & 996. 1953; Moldenke, Résumé 54 & 445. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Moldenke, Phytologia 14: 149—151. 1966; Moldenke, Résumé Suppl. 14: 6. 1966.

Sprengel (1825) asserts that this species is native to Jamaica and Hispaniola, but I have not as yet seen any material of it from Hispaniola — and this in spite of the intensive exploratory work being done on this island by my friend, Alain Liogier. Bocquillon (1863) records it from St. Thomas, but his "record" doubtless refers to C. ampla Schau. Sagra, Grisebach, Sauvalle, Garcia Caffizares, and other authors record it from Cuba, but all these references are doubtless to the closely related C. cubensis Urb.

My very good friend, William T. Stearn, in a letter to me dated March 4, 1960, says "In Fedde, Repert. 40: 82 (1936) you say that the type of Callicarpa reticulata Swartz 'was collected by O. P. Swartz in Jamaica'. Swartz placed, however an asterisk against his diagnosis, which, as indicated in his preface, means that this was not based on a specimen of his own gathering but on material from the West Indies which he found in the herbarium of Sir Joseph Banks (now in the British Museum (Natural History) London). In his *Flora Indiae Occidentalis* 1: 253 (1797) he even says "Species haecce, cujus descriptionem mihi praebuerunt speci-

mina in Museo Banksiano'. These specimens were gathered by W. Wright, F. Masson and H. de Ponthieu. You then state that 'no material of the type collection has thus far been available for examination' but presumably from the close agreement between Swartz's description and a W. Wright specimen in the British Museum (Nat. Hist.) you consider the latter 'to represent the true C. reticulata'. This is a fortunate opinion, because there can be no doubt that these Wright specimens are in fact the type-collection! Your description thus unknowingly gives a good modern account of the type."

The C. F. Baker 5126, distributed as C. reticulata, is, of course, like all other Cuban material so determined, actually C. cubensis Urb.

In all, 3 herbarium specimens of C. reticulata, including the type, have been examined by me.

Additional & emended citations: JAMAICA: W. Wright s.n. [1783] (Bm--type, Ed--isotype, N--isotype).

CALLICARPA REVOLUTA Moldenke in Fedde, Repert. Sp. Nov. 33: 143. 1933.

Bibliography: Moldenke in Fedde, Repert. Sp. Nov. 33: 143 (1933), 39: 299 (1936), and 40: 56, 73, 74, 78, 119, & 129. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87 (1942) and [ed. 2], 43 & 178. 1949; Moldenke, Alph. List Cit. 3: 929 (1949) and 4: 1035. 1949; Alain in León & Alain, Fl. Cuba 4: 305 & 307. 1957; Moldenke, Résumé 50 & 445. 1959; Moldenke, Phytologia 14: 155. 1966.

In all, 3 herbarium specimens of C. revoluta, including the type, and 6 mounted photographs have been examined by me.

Emended citations: CUBA: Oriente: Shafer 8308 (W--696508--isotype).

CALLICARPA RIDLEYI S. Moore, Journ. Bot. Lond. 63: Suppl. 80. 1925.

Bibliography: S. Moore, Journ. Bot. Lond. 63: Suppl. 80. 1925; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 64 & 87. 1942; H. N. & A. L. Moldenke, Fl. Life 2: 78. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144 & 178. 1949; Moldenke, Résumé 189 & 445. 1959.

Moore (1925) describes this species as "Arbor; ramulis tetragonis brunneo-farinoso-tomentosis dein glabris; foliis petiolo farinoso \pm 2 cm. long. insidentibus ellipticis caudato-acuminatis (acumine circa 1.5 cm. long.) apice mucronatis basi breviter cuneatis margine integris papyraceis supra pilis sparsis minutis stellatis inspersis deinde glabris subtus minute farinoso plerisque 11--15 x 4--6 (raro 8) cm. costis lateralibus utrinque 10 pag. inf. (uti costulae et reticulum) prominentibus; cymis petiolos tandem excedentibus in fructu 7.5 x 6 cm. in florae 3.5 x 3 cm. plurifloris uti pedicelli calycesque farinosi; pedicellis \pm 1.5 mm. long.; calyce denticulato 1.5 mm. long.; corollae extus

minute tomentosae tubo 2.5 mm. long. lobis ovato-oblongis obtusis 1.5 mm. long.; antheris fere 2 mm. long.; drupa depresso globosa 3--4 mm. diam."

The type of the species was collected by Henry Ogg Forbes (no. 272) at an altitude of 2000--2700 feet, at Pasir Orai, Bantam, Java, and is probably deposited in the herbarium of the British Museum (Natural History) in London. Moore notes that "The fruit is described from a specimen at the Museum collected by Mr. Ridley on Mt. Salak."

Nothing further is known to me of this species.

CALLICARPA RIVULARIS Merr., Philip. Journ. Sci. Bot. 7: 340--341. 1912.

Synonymy: *Callicarpa angusta* var. *longifolia* H. J. Lam, Verbenac. Mal. Arch. 66 & 67. 1919. *Callicarpa angusta* var. β H. J. Lam, Verbenac. Mal. Arch. 67. 1919. *Callicarpa erioclona* var. *typica* f. *rivularis* (Merr.) Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 19. 1921.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 7: 340--341. 1912; H. J. Lam, Verbenac. Mal. Arch. 48, 66--68, & 362. 1919; Prain, Ind. Kew. Suppl. 5, pr. 1, 43. 1921; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 19. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 387--388. 1923; Moldenke, Prelim. Alph. List Invalid Names 9 & 10. 1940; Moldenke, Alph. List Invalid Names 8 & 9. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 62 & 87 (1942) and [ed. 2], 141 & 178. 1949; Moldenke, Résumé 83, 241, 243, & 445. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 43. 1960; Moldenke, Phytologia 14: 179 (1966), 15: 15 (1967), and 21: 330. 1971.

Shrub, apparently sometimes subscandent, 2--5 m. tall; branches terete or the ultimate ones somewhat compressed, along with the branchlets very densely covered by a whitish or yellowish-white indumentum composed of short stellate hairs with some stellate-plumose ones intermixed; branchlets slender; leaves decussate-opposite; petioles 0.5--1.8 cm. long, densely stellate-tomentose with yellowish-white hairs; leaf-blades chartaceous, lanceolate or narrow-lanceolate to narrowly lanceolate-obovate or narrowly oblanceolate, 7--20 cm. long, 1.5--4 cm. wide, equally narrowed and attenuate-acute at both ends or slenderly acuminate at the apex, serrate or very minutely repand-dentate along the margins except at the base and apex or slightly and irregularly denticulate above and entire on the lower half, dark and quite glabrous above when dry or with a few stellate hairs along the midrib, densely whitish-tomentose beneath with a dense sometimes yellowish-white indumentum; secondaries about 9 pairs, arcuate-ascending, prominent beneath, anastomosing; vein and veinlet reticulation abundant but obscure; inflorescence densely stellate-tomentose with yellowish-white hairs; cymes axillary, solitary, about 3 cm. wide or less, dichotomously branched, rather lax, comparatively few-flowered; peduncles about as long as the sub-

tending petiole; calyx somewhat infundibular, about 2 mm. long, extremely densely white- or grayish-puberulent to appressed-lanate or densely stellate-hairy on the outer surface, the rim slightly 4-toothed; corolla white, about 3 mm. long, somewhat puberulent on the outside, the tube scarcely exerted, the limb 4-lobed, slightly pubescent or stellate-pilose externally; anthers 1.3 mm. long, glandulose on the back; drupes globose, about 3 mm. wide, glabrous, with 4 pyrenes.

The type of this species (as well as of Lam's C. angusta var. longifolia) was collected by Frederick William Foxworthy [Herb. Philip. Bur. Sci. 660] on rocky riverbanks, at about 1150 meters altitude, on Mount Victoria, Palawan, Philippine Islands, on March 23, 1906, and was deposited in the herbarium of the Philippine Bureau of Science, now destroyed. Merrill (1912) cites also another Foxworthy collection, Herb. Philip. Bur. Sci. 719, gathered on March 24, 1906, at apparently the same locality, making it a topotype. Bakhuizen van den Brink (1921) cites these collections as Foxworthy 660 & 719 and cites no other material.

Lam (1919) comments in his discussion of C. angustifolia King & Gamble that "This species has a close affinity with C. angusta var. P [i.e., var. longifolia] and perhaps it will appear that it is synonymous with it. But it seems to differ from it by the pubescent corolla and the hardly denticulate leaves". Merrill (1912) says of C. rivularis: "A species manifestly very closely allied to Callicarpa angusta Schauer, differing especially in its indumentum". Bakhuizen van den Brink (1921) reduces it to form rank under C. erioclona Schau.

Callicarpa rivularis has been collected in flower and fruit in March and April. Material has been misidentified and distributed in herbaria as C. angusta Schau. and the two Foxworthy collections were actually so cited by me in a previous installment of these notes.

In all, 6 herbarium specimens of C. rivularis, including the type collection, have been examined by me.

Citations: PHILIPPINE ISLANDS: Palawan: Foxworthy s.n. [Herb. Philip. Bur. Sci. 660] (Bz--17595--isotype, N--isotype), s.n. [Herb. Philip. Bur. Sci. 719] (Bz--17594, N, W--627037, 2).

CALLICARPA ROIGII Britton, Bull. Torrey Bot. Club 53: 463. 1926.

Synonymy: Callicarpa melanocarpa C. Wright ex Moldenke in Fedde, Repert. Sp. Nov. 40: 46, in syn. 1936. Callicarpa polyantha C. Wright ex Moldenke in Fedde, Repert. Sp. Nov. 40: 46, in syn. 1936.

Bibliography: Griseb., Cat. Pl. Cub. 216. 1866; N. L. Britton, Bull. Torrey Bot. Club 53: 463. 1926; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke in Fedde, Repert. Sp. Nov. 39: 301 (1936) and 40: 41, 45--46, 77, 119, 128, & 131. 1936; Moldenke, Alph. List Common Vern. Names 12. 1939; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Prelim. Alph. List Invalid Names 12. 1940;

Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87. 1942; Moldenke, Alph. List Invalid Names 10. 1942; Moldenke, Phytologia 2: 95. 1945; Moldenke, Alph. List Cit. 1: 3 & 310. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 38. 1947; H. N. & A. L. Moldenke, Fl. Life 2: 79. 1948; Moldenke, Alph. List Cit. 2: 420 & 648 (1948), 3: 867 & 868 (1949), and 4: 1020, 1047, & 1144. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43 & 178. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 4. 1950; Alain in León & Alain, Fl. Cuba 4: 304 & 306. 1957; Moldenke, Résumé 50, 245, 246, & 445. 1959; Moldenke, Phytologia 13: 433. 1966; J. A. Clark, Card. Ind. Gen. Sp. Pl. n.d.

Recent collectors describe this plant as a shrub, 3--4 m. tall, growing along roadsides, flowering in April, and fruiting in January. They record the vernacular variant "filigrana del pinar". Since the plant is also known as "filifrana fruto blanco", one may assume that its mature fruits are white, although all that I have seen (in the dried state) were black.

In all, 32 herbarium specimens of *C. roigii*, including the types of all the names involved, and 11 mounted photographs have been examined by me.

Additional & emended citations: CUBA: Pinar del Río: Acuffa & Roig 10871 (Es); Acuffa & Zayas 19932 (Z); León 15415 (Ha, N); J. T. Roig 3220 (Ha—isotype, W—1147111—isotype), 19871 (Es), s.n. [April 11, 1924] (Es); C. Wright 231/8 [Herb. Sauvalle 1773] (Hv), 2169 (F—244614), 3169 [Herb. Sauvalle 1773] (E—119136, Hv, Pa, W—56139).

CALLICARPA RUBELLA Lindl.

Additional & emended synonymy: Callicarpa sessilifolia Wall., Numer. List "49" [=50], hyponym. 1829. Callicarpa tenuiflora Champ. ex Benth. in Hook. Journ. Bot. & Kew Gard. Misc. 5: 135. 1853. Callicarpa lasiantha Lemaire ex Lemaire & Verschaf., Ill. Hort. 6: sub pl. 202, in obs. 1859; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938. Callicarpa purpurea Hort. Angl. & Lindl. ex Lemaire & Verschaf., Ill. Hort. 6: pl. 202, nom. provis. 1859 [not *C. purpurea* Hort. ex Moldenke, 1941, nor A. L. Juss., 1806, nor Nakai, 1923]. Callicarpa purpurea Hort. ex Regel, Gartenfl. 9: 56. 1860. Callicarpa violacea Hérincq, Hort. Franç. 3 (2): 11. 1861. Callicarpa japonica Hort. ex Pritzell, Icon. Bot. Ind. 2: 55. 1866 [not *C. japonica* Hort. ex Moldenke, 1936, nor L. f., 1966, nor Matsum., 1923, nor Miq., 1927, nor Thunb., 1784, nor Thunb. auct. ex Raf., 1838]. Callicarpa purpurea? Van Houtte ex Rehd. in C. S. Sarg., Pl. Wils. 3: 390, in syn. 1916. Callicarpa violacea Korth. ex H. J. Lam, Verbenac. Mal. Arch. 53, in syn. 1919. Callicarpa purpurea Van Houtte apud P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 38, in syn. 1932. Callicarpa cuspidata Bakh. (in part) apud P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 38, in syn. 1932 [not *C. cuspidata* Hassk.,

1921, nor Lam & Bakh., 1951, nor Roxb., 1814]. Callicarpa rubella f. crenata P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 40. 1932. Callicarpa rubella f. angustata P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 40. 1932. Callicarpa rosea Lindl. ex Moldenke in Fedde, Repert. Sp. Nov. 40: 103, in syn. 1936.

Bibliography: Gaertn., Fruct. & Sem. Pl. 2: pl. 94. 1791; Lindl., Bot. Reg. 11: pl. 883. 1825; Spreng. in L., Syst. Veg., ed. 16, 4 (2): 41 (1827) and ed. 16, 5: 126. 1828; Wall., Numer. List "49" [=50]. 1829; D. Dietr., Syn. Pl. 1: 428. 1839; Steud., Nom. Bot., ed. 2, 257. 1840; Walp., Repert. 4: 130. 1845; Schau. in A. DC., Prodr. 11: 645. 1847; Jacques & Hérincq, Lan. Gén. Pl. Arb. & Arbust. [Fl. Jard. Eur. 3:] 503. 1851; Benth. in Hook. Journ. Bot. & Kew Gard. Misc. 5: 135. 1853; Van Moutte, Fl. des Serres 30 [ser. 2, 13]: 127--128, pl. 1359. 1858; Lemaire & Verschaf., Ill. Hort. 6: pl. 202. 1859; Groenland, Rev. Hort. 8 (4): 106--108, fig. 24 & 25. 1859; Lindl., Gard. Chron. 1859: 96. 1859; C. Müll. in Walp., Ann. 5: 709. 1860; Regel, Gartenfl. 9: 56. 1860; Benth., Fl. Hongk. 270. 1861; Hérincq, Hort. France 3 (2): 11, pl. 4. 1861; Regel, Gartenfl. 12: 101. 1863; Pritzel, Icon. Bot. Ind. 1: 188 (1866) and 2: 55. 1866; M. T. Masters, Gard. Chron. 1871: 173, fig. 38. 1871; S. Kurz, Forest Fl. Brit. Burma 2: 274--275 & 589. 1877; Gamble, List Trees Darj. Dist. 60. 1878; Gamble, Man. Indian Timb., ed. 1, 282 & 503. 1881; W. Robinson, The Garden 23: 540, pl. 392. 1883; Nicholson, Ill. Dict. Gard. 1: 242. 1884; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 569. 1885; Maxim., Bull. Acad. Sci. St. Pétersb. 31: 75. 1886; Maxim., Mém. Biol. 12: 504 & 506. 1886; G. Watt, Dict. Econom. Prod. India 2: 27. 1889; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 255. 1890; N. E. Br. in G. W. Johnson, Gard. Dict. 157. 1890; Kuntze, Rev. Gen. Pl. 2: 503. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 386. 1893; W. P. Wright in Cassell, Dict. Pract. Gard., ed. 1, 1: 156. 1902; Gamble, Man. Indian Timb., ed. 2, 525. 1902; Rehd. in L. H. Bailey & Mill., Cycl. Am. Hort. 1: 217. 1906; W. P. Wright in Cassell, Dict. Pract. Gard., ed. 2, 1: 156. 1907; S. T. Dunn, Journ. Linn. Soc. Lond. Bot. 38: 363. 1908; Dunn & Tutchner, Kew Bull. Misc. Inf. Addit. Ser. 10: 202 & 203. 1912; Elbert, Meded. Rijksherb. Leid. 12: 15. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 332 & 334. 1913; H. J. Lam, Meded. Rijksherb. Leid. 37: 33. 1914; Rehd. in L. H. Bailey, Stand. Cycl. Hort. 2: 629. 1914; Rehd. in C. S. Sarg., Pl. Wils. 3: 369--370. 1916; Léveillé, Cat. Pl. Yun-Nan 277. 1917; E. D. Merr., Philip. Journ. Sci. 11: 249. 1919; H. J. Lam, Verbenac. Malay. Arch. 46, 53--54, 58, & 362. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 23. 1921; Stapf, Ind. Lond. 1: 526. 1929; P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 501, 506, 511, & 512. 1932; P'ei, Sinensia 2: 67. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16, 17, 35, 38--40, & 48. 1932; Grey & Hubbard, List Pl. Atkins Inst. 38. 1933; Rehd., Journ. Arnold Arb. 15: 323--324. 1934; Cotton in Curtis, Bot. Mag. 157: pl. 9340. 1934; L. H. Bailey, Cat. Florists Handl. Verbenac. n.p. 1935; Hand.-Mazz., Symb. Sin. 7: 901. 1936; Moldenke in Fedde,

Report. Sp. Nov. 39: 297 & 300 (1936) and 40: 98, 102—104, 120, 123—125, & 128. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 412 & 414. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 45 & 46. 1938; Moldenke, Geogr. Distrib. Avicenn. 36. 1939; Moldenke, Suppl. List Common Vern. Names 21. 1940; Moldenke, Prelim. Alph. List Invalid Names 10—13. 1940; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Biswas, Indian Forest Rec. Bot., new ser., 3: 41. 1941; Moldenke, Known Geogr. Distrib. Verbenac., ed. 1, 54—56, 58, 59, 63, 64, 66, 71, & 87. 1942; Moldenke, Alph. List Invalid Names 8—11. 1942; Moldenke, Phytologia 2: 70 & 95. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 386. 1946; Moldenke, Alph. List Cit. 1: 91, 119, 208, & 210. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 38. 1947; Moldenke, Phytologia 2: 343. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 3 & 28. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 63. 1948; Moldenke, Alph. List Cit. 2: 359, 404, 408, 434, 487, 563, 566, 601, 608, & 619 (1948), 3: 657, 727, 877, & 971 (1949), and 4: 1011. 1949; Moldenke, Phytologia 3: 139. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 124, 125, 128, 131, 135—137, 143, 144, 146, 157, & 178. 1949; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 358 & 359. 1951; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 280, 281, 286, 288, 296—298, 302, & 311. 1951; Moldenke, Phytologia 4: 75 (1952) and 4: 191. 1953; Moldenke, Inform. Mold. Set. 51 Spec. 2. 1956; Anon., Kew Bull. Gen. Index 1929—56, p. 59. 1959; Moldenke, Résumé 159, 160, 165, 168, 174, 175, 177, 187, 189, 194, 214, 242—244, 246—248, 379, & 445. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 386. 1960; Panigrahi & Naik, Bull. Bot. Surv. India 3: 376. 1961; Deb, Bull. Bot. Surv. India 3: 314. 1961; Srinivasan & Agarwal, Bull. Bot. Surv. India 5: 86. 1963; Moldenke, Dansk Bot. Arkiv 23: 87. 1963; Eacker & Bakh., Fl. Java 600—601. 1965; R. E. & C. R. Harrison, Know Your Trees 39, pl. 93. 1965; Matthew, Bull. Bot. Surv. India 8: 164. 1966; Panigrahi & Joseph, Bull. Bot. Surv. India 8: 143 & 151. 1966; Moldenke, Résumé Suppl. 14: 3. 1966; Moldenke, Phytologia 14: 52, 102, 105, 106, 142, 143, & 148 (1966) and 14: 222, 225, & 249. 1967; Tingle, Check List Hong Kong Pl. 38. 1967; Moldenke, Phytologia 15: 30 (1967) and 16: 364 & 366. 1968; Moldenke, Résumé Suppl. 16: 9 & 13 (1968) and 17: 7. 1968; El-Gazzar & Wats., New Phytol. 69: 460, 483, & 485. 1970; Moldenke, Phytologia 21: 33, 49, 102, 103, 109, 152, 158, 163, 164, 225, 331, 334, 346, & 387. 1971.

Illustrations: Gaertn., Fruct. & Sem. Pl. pl. 94. 1791; Lindl., Bot. Reg. 11: pl. 883 (in color). 1825; Van Houtte, Fl. des Serres 30 [ser. 2, 13]: 127 & 128, pl. 1359 (in color) [as "C. purpurea"]. 1858; Groenland, Rev. Hort. 1859: 106 & 107, fig. 24 & 25. 1859; Lindl., Gard. Chron. 1859: 96. 1859; Lemaire & Verschaf., Ill. Hort. 6: pl. 202 [as "C. purpurea"]. 1859; Regel, Gartenfl. 9: 56 [as "C. purpurea"]. 1860; Hérincq, Hort Franç. 3 (2): 11, pl. 4. 1861; M. T. Masters, Gard. Chron. 1871: 173, fig. 38. 1871; W. Robinson, The Garden 23: 540, pl. 392. 1883; Cotton in Curtis, Bot. Mag. 157: pl. 9340 (in color). 1934; R. E. & C. R. Harrison, Know Your Trees pl. 93 (in color). 1965.

It should be noted here that the C. cuspidata accredited to Hasskarl in the synonymy above is actually a synonym of C. longifolia Lam., that accredited to Lam & Bakhuizen van den Brink is C. longipes Dunn, that ascribed to Roxburgh is C. pedunculata R. Br., and that credited to Bakhuizen van den Brink alone is in part C. rubella Lindl. and in part C. longipes Dunn; the C. japonica credited to "Hort. ex Moldenke" and to Linnaeus the younger is a synonym of C. japonica Thunb., a valid species, that credited to Matsumura and to Miquel is C. japonica var. luxurians Rehd., and that credited to "Thunb. auct. ex Raf." is C. longifolia Lam.; the C. purpurea of Jussieu is C. dichotoma (Lour.) K. Koch, while that attributed to "Hort. ex Moldenke" is C. longifolia Lam. and that ascribed to Nakai is C. japonica Thunb.

Recent collectors describe C. rubella as a large, slender, or straggling shrub, 1--5 m. tall, bushy, diffuse, "fern-branched", or a small tree, the leaves light-green, viscous above, the pedicels purple, the buds white, the flowers fragrant or slightly fragrant, the calyx stellate-tomentose, the anthers golden-yellow, the ovary pubescent, and the fruit at first green, later bright-blue or lilac to purplish-red or purple. Rock mistakenly refers to the drupes as "berries".

The species has been found growing on coral reefs, in semi-shade, in woods, forests, evergreen forests, densely shaded mixed woods, or thickets, in ravines and open ravines, and along valley roadsides or roadsides in general, at altitudes from sealevel to 2330 meters, flowering in March and from May to November, fruiting from July to January.

Deb (1961) reports the species "frequent" on hills in Manipur, Panigrahi & Joseph (1966) say that it is "abundant" in the shrub layer in Nefa, Panigrahi & Naik (1966) found it to be "very common in the Subansiri Frontier Division", and Prain reports it common in jungles in the Naga Hills, India. Dee found it to be common in open pine forests in Thailand, while, in the same country, Amnak describes it as a common shrub by streams. In Yunnan, Chin, Rock calls it a "small common shrub", while in Kwangsi it was found by Tsang to be fairly common in roadside meadows and fairly common as scattered shrubs in dry clay and silt on rocky soil. The same collector in Tonkin found it "fairly common in thickets on dry clayey soil".

Common and vernacular names recorded for the species are "angro", "callicarpa rougeâtre", "callicarpe à fruits pourpres", "chaak tsai shue", "kap ts'ing", "nam lai phi sua", "pha", "sugroomook", "sugroo-mook", "sugrómuk", and "suren". Hom reports that it serves as a drug plant in Kwangtung.

Watt (1889) tells us that C. rubella is "A small tree of the North-East Himalaya to the hills of Martaban", while Lam (1914) gives its distribution as "Punduah, Sikkim, Khasiah u. Jainteah; China; Sumatra; Java". Actually, it seems to grow from Pakistan and India to Thailand and Indochina, north to Hongkong and China,

and east to Sumatra, Krakatoa, Java, and Celebes. Bean (1951) avers that it was introduced into cultivation [in England] in 1821, while Bailey (1935) reports that it is handled for the horticultural trade by the Knap Hill nursery.

Lam (1919) says "We could not find the reason why C. rubella Lindl. should have the priority above C. sessilifolia Wall., but retained the first name, nevertheless, since we found that all authors use it." Actually, Wallich's name was published 10 years earlier than Lindley's, but without description, and therefore is invalid under the present rules of botanic nomenclature. Lam cites Wallich's binomial as having been published in "1828", but the page 50 on which it occurs was actually not issued until 1829. Lam also comments in regard to C. rubella: "Its affinity is, especially in regard with the flowers, with C. pedunculata, but its leaves are always cordate, sessile and narrower, whilst its cymes are smaller, fasciculate, not widely dichotomous as in C. pedunculata". Bakhuizen van den Brink (1921) reduced C. rubella Lindl., C. sessilifolia Wall., and C. tenuiflora Champ. to synonymy under what he called C. cuspidata Roxb., while Fletcher (1938) reduces "C. cuspidata Roxb., in part" to the synonymy of C. rubella. Srinivasan & Agarwal (1963) reduce C. rubella to synonymy under what they call C. rosea Lindl.

Chang (1951) includes C. dielsii (Léveillé) P'ei, C. panduriformis Léveillé, C. rubella var. dielsii (P'ei) Li, C. rubella var. hemsleyana Diels, and Viburnum dielsii Léveillé in the synonymy of C. rubella. However, I regard C. rubella var. hemsleyana and C. rubella var. dielsii as valid varieties (with Viburnum dielsii and Callicarpa dielsii as synonyms of the latter), and C. panduriformis as a synonym of C. longipes Dunn.

Merrill (1919) tells us that C. brevipetiolata Merr. differs from C. rubella in that it has the lower surface of its leaf-blades completely covered with dense stellate-tomentose indumentum. Regel (1863) says "Callicarpa lanata Vahl. [Abgebildet im Botanical Magazine in Jahrgang 1861] (pag. 96 cum ic.). Ist identisch mit der in der Gartenflora 1860, pag. 56 erwähnten C. purpurea Hort. (Fl. des serres tab. 1359. Ill. hort. tab. 202). Vahls Name (Vahl. Symb. III. 13) als der älteste, ist der richtige. Stammt aus den tropischen Neuholland." However, I regard Vahl's C. lanata as a synonym of C. pedunculata R. Br., which is, indeed, native to Australia [=Neuholland], while C. rubella is not known from that continent. It is worth noting here that the illustrations given by Van Houtte (1858), Lemaire & Verschaffelt (1859), and Regel (1860) are all mis-labeled "Callicarpa purpurea" [a very different species, now known as C. dichotoma (Lour.) K. Koch] but truly represent C. rubella.

The corolla of C. rubella is described as "pink" on Dee 973, Hom 142, and W. T. Tsang 22497 & 29133, "mauve" on W. R. Sykes

202/64, "red" on Pitepool 19898 and Steward & Cheo 647, "maroon" on Levine & McClure 258/7177, "purplish" on Ching 5922, "purplish-rose" on Forrest 8393, and "white" on Chevalier 1708 and Ying 772.

Lindley (1825) says "This species of Callicarpa is well distinguished from all others of the genus by the peculiar outline of its leaves, which are sessile and approaching almost to panduriform, with a long taper point. It was brought from China, in 1822, for the Horticultural Society, by the late Mr. John Potts. Our drawing was made in the Chiswick Garden, in May last."

P'ei (1932) describes his f. angustata as follows: "Leaves thickly chartaceous, densely pubescent with stellate hairs, indumentum denser beneath, lanceolate oblong to oblanceolate-oblong, broadened above the middle, acuminate, base cordate, sessile, glandular on both surfaces, 8.5 cm. x 2 cm., 11.2 cm. x 4 cm., 11.7 cm. x 2.3 cm., 15 cm. x 4.4 cm. Peduncles 1 to 1.8 cm. long. Fruit 0.25 cm. in diameter." He does not designate a type, but bases the form on Forrest 7869 & 8393, A. Henry 2412, 9412, & 9412a, J. F. Rock 2915, 6932, & 7101, and Schneider 3191, all from Yunnan, China. He describes his f. crenata as having the "Leaves thin, chartaceous, densely pubescent with simple hairs, densely glandular on both surfaces, oblanceolate, cordate, apex acuminate, crenately serrate, 4.5 cm. x 1.2 cm., 6 cm. x 1.1 cm., 8.2 cm. x 2.5 cm. Peduncles 0.6 to 0.9 cm. long. Fruit 0.1 to 0.15 cm. in diameter." Again, he designates no type, but bases the form on R. C. Ching 1610 & 5922, Tsiang 1648, and Ying 772, 870, & 1155, all from (he says) Kwangsi, China. However, specimens of Ying 772 and 1155 which I have seen bear labels indicating that they were collected in Kwangtung.

The type of Callicarpa sessilifolia is Wallich 1837 from "Pundua". The Wallich, Numer. List "49" [=50] reference, where this binomial first occurs, is erroneously dated "1828" by some writers.

For C. violacea Korth. Lam (1919) says "see: Korthals. Verband over de Natuurl. Gesch. der Ned. O. I. bezittingen 1839--'42. Botanie: nomen nudum?", but I fail to find this binomial mentioned anywhere in this work.

Maximowicz (1886) cites Forbes s.n. and Wright s.n. from Hongkong, Sampson s.n. from "pluribus locis" in Kwangtung ("prov. Canton"), and "tum in Himalaya: Khasia et Pendjab!" Forbes & Hemsley (1890) add a Champion s.n. from Hongkong and give the overall distribution of the species as "Sikkim, Khasia, and Jaintea mountains, India". Rehder (1916) cites C. Wright 380 and C. Ford s.n. from Hongkong and A. Henry 9412 & 9412a and C. Schneider 3161 from Yunnan, commenting "The Yunnan specimens agree with those from Hongkong except that the pubescence on the upper surface of the leaves is shorter and denser". P'ei (1932) cites for what he regards as the typical form of the species only Ford s.n., Wright s.n., and Chun 6544, all from Hongkong, with the

comment "Distribution: Formosa to Indo-China and reported from India and the Malay Archipelago. This differs from its allies by its obovate leaves which are sessile or subsessile and more or less cordate. Ovary glandular. Fruit 0.15 in diameter, densely pubescent when young. The species varies very much in its shape of leaves, length of peduncles and petioles."

Lam (1919) cites the following specimens seen by him: GREATER SUNDA ISLANDS: Buton: Elbert 2814. Java: Elbert 337 (Le--908.267-1141), s.n. [Nov. 1907] (Le--908.267-1142); Junghuhn s.n. [Ungarang, Medinie] (Le--908.267-1143). Sumatra: Korthals 5816.

Van Houtte (1858) describes the history of the species as follows: "C'est dans une des serres de notre collègue, M. Aug. van Geert, horticulteur en cette ville, que nous avons fait dessiner et peindre le modèle qui a servi à exécuter la planche ci-contre. Introduit en Angleterre par M. Standish, le Dr. Lindley suppose qu'il provient de l'un des voyages qu'a faits en Chine le célèbre voyageur, M. Fortune, auquel nous devons tant de reconnaissance pour le bien qu'il a fait à l'horticulteur! Dans ces derniers temps ne l'a-t-il pas presque alimentée tout seul avec Lobb, en nous apportant de ces plantes impérissables, de ces végétaux fit for the million, dont on ne se lasse jamais et dont le commerce horticole tire tant de profit et les amateurs tant de jouissances vives et incessantes!

"Nous reproduisons aussi, comme pendant à notre dessin celui qu'en a donné le Gardeners' Chronicle. Mais cette plante, connue dans le commerce sous le nom de Callicarpa purpurea et que nous figurons ici, ne serait pas l'espèce dont elle porte le nom.....; ce nom de purpurea est donc tout provisoire, et l'indication de sa patrie nous fait aussi défaut; il eût été aisé cependant de s'en enquérir auprès de M. Standish, si tant est que celui-ci s'inquiète de ces bagatelles.

"Quoi qu'il en soit, disons qu'ici la plante a gelé jusqu'à terre et qu'au printemps suivant elle a vigoureusement repoussé du pied, cela donne la mesure de son degré de rusticité. Donc, serre froide en Belgique, plein air, rusticité, plus au Sud. Fleurissant au commencement de l'été, elle est couverte vers l'automne de ses très nombreuses et très jolies baies d'un lilas purpurin qu'elle conserve pendant tout l'hiver. -- Sa multiplication par voie boutures, à défaut de graines, est des plus faciles."

Masters (1859) gives this account: "No plant excited more interest at the last autumn meeting of the Horticultural Society in St. James's Hall, than a little shrub from Mr. Standish, of Bagshot, loaded with the most beautiful shining deep violet berries. Few had seen such a species before, or suspected what it might be; the fact being that Callicarpa, the genus to which it belonged, has never before produced the beautiful fruit, from which its botanical name has been formed. The accompanying figure will convey a good idea of its general appearance.

"Not having seen the flowers or the old leaves, we are in some doubt to what species of Callicarpa it should be referred; and in

selecting that called purpurea we by no means overlook the possibility of its proving botanically distinct. In the form of the leaves, and the proportional size of the clusters of berries, it agrees very well; but the hairiness is that of C. rubella, quite a different plant. But these Callicarpas certainly vary much in hairiness at different periods of growth and under different circumstances. All that we can say for the present is that it seems to be a state of C. purpurea, the Porphyra dichotoma of Loureiro; but that it may possibly be the C. lasiantha. At all events it is a most interesting little greenhouse shrub, brought from China, we believe by Mr. Fortune. What makes it so extremely useful is that its berries retain their beautiful colour till long after Christmas. Some indeed now before us are as brilliant as they were in November."

Elbert (1912) cites Elbert 337; Diels (1913) cites Forrest 853; Panigrahi & Joseph (1966) cite Panigrahi & Joseph 14546 from Nefa; and Panigrahi & Naik (1961) cite Pitepool 19898 from the Subansiri Frontier Division of India.

Chang (1951) cites the following specimens as typical C. rubella: CHINA: Hunan: Chang 4560; S. C. Chen 1857, 2581; Ho 1159, 1428, 1623; Hsin 982; L. R. Li 276; Tseng, Chu, & Chang 10144; Yeh 253. Kiangsi: Chiang 10159; Mo 21151. Kwangsi: Chin 5681, 5922, 7189; Hsin 342, 634, 1716, 21128, 21623, 22213, 22429, 22436, 23133; Huang 39374, 40586; Li 81064; Liu 28769; Tseng 22497, 22744, 27598, 27922. Kwangtung: Canton Chr. Coll. Herb. 6968; Central Herb. 153539; Chang 44; H. Y. Chen 6531, 6544, 7049; L. H. Chen 41181, 41842; S. C. Chen 1686, 1797, 5633; Chiang 744; Hsin 10020; Huang 30716, 31283, 32474; Kao 52608, 52877; H. J. Liang 61865; S. H. Liang 84219, 84512, 84605; Liu 23959; Tseng 20762, 21319, 25640; Tso 20752. Kweichow: Tsiang 5315. Sikiang: Fang 6030. Szechuan: Fang 1272, 1636, 6286, 7821. Yunnan: Forrest 8393; Tsai 54215, 60238, 60479, 61437, 62224; Wang, Kao, & Liu 100060. CHINESE COASTAL ISLANDS: Hainan: Tso & Chen 43351. I regard Tsiang 5315 as var. hemsleyana Diels.

For what he considers to be C. rubella f. angustata Chang cites: CHINA: Kwangsi: S. C. Chen 3731, 91267; Hsin 25184; Kao 55899; Kwangsi Mus. Herb. 5446; Liang 65924; Soo 69035; Teng 13249; Tseng 24433. Kwangtung: Tsiang 1684; Tso 22416. Kweichow: Tsiang 4222. Sikiang: Handel-Mazzetti 5262. Yunnan: Forrest 7869; Tsai 54506, 54623, 54909, 56515, 56893, 59143, 60111, 60399, 60431, 60542, 60728, 62011, 62363; Tsiang 12300.

For what he considers to be C. rubella f. crenata Chang cites: CHINA: Hunan: Liang 519. Kwangsi: Hsin 1736, 25271; Huang 40762; S. K. Li 81055, 81086; Liang 66907, 69482, 69589; Liu 28507; Soo 69913; Tseng 22953, 23346, 26521, 26700; Tso 23653; Wang 150. Kwangtung: Central Herb. 67887; Chang 4373; Huang 37864, 38433;

Lin 9585; Tsiang 772, 870, 1155; Tso 22030, 22323.

It should be noted here that Rehder (1916) cites Walp., Ann. 5: 709 as published in "1858", when actually pages 641-966 of that volume did not appear in print until the year 1860.

Material of C. rubella has been misidentified and distributed in herbaria under the names C. dichotoma (Lour.) K. Koch, C. formosana Rolfe, C. longifolia Lam., C. reevesii Wall., C. rubella var. hemsleyana Diels, and Helicteris sp. On the other hand, the McClintock s.n. [Nov. 16, 1959], distributed as C. rubella, is actually C. bodinieri var. giraldii (Hesse) Rehd., Kingdon-Ward 17640 and Kuntze 5896 are C. brevipetiolata Merr., Teijsmann 8942 is C. caudata Maxim., Boden-Kloss 14464 is C. longifolia f. floc-cosa Schau., Rachmat 206 is C. pilosissima Maxim., and Keng 848, Weiss 1586, C. Wright s.n. [Hong Kong], and Ying 744 are C. rubella var. hemsleyana Diels.

In all, 95 herbarium specimens and 2 mounted photographs of typical C. rubella have been examined by me.

Additional citations: PAKISTAN: East Bengal: W. Griffith 6036 (S). INDIA: Assam: C. B. Clarke 44124d (W--803647); Prain s.n. [Kohima, 1886] (W--325385). Khasi States: Hooker & Thomson s.n. [Mont. Khasia 4000 ped.] (S, W--2496753); Schlagintweit 483 (W--804650). Madras: C. B. Clarke 14847 [601] (W--802500). West Bengal: Nasker 125 (We). BURMA: Upper Burma: Badal Khan 65 (Na--16189). CHINA: Kwangsi: R. C. Ching 5922 (Ca--409871, N, W--1248673); Steward & Cheo 647 (S); W. T. Tsang 22497 (S), 24433 (N). Kwangtung: Hom 142 [Herb. Lingnan Univ. 19450] (N); C. O. Levine s.n. [Herb. Canton Chr. Coll. 1449] (Ka--63121), s.n. [Herb. Canton Chr. Coll. 1610] (Ka--63268, W--874851); Levine & McClure 258/1777 [Herb. Canton Chr. Coll. 6968] (N, Ph, S, W--1248847); E. D. Merrill 10654 (Ca--992483, Gg--31977, N); Tsiang 870 (Ca--358868), 1684 (Ca--363144); Ying 772 (Ca--358025, N), 1155 (Bz--17562, Ca--358899). Kweichow: Tsiang 4222 (S), 5482 (N, W--1554977). Yunnan: Forrest 8393 (S); A. Henry 9412 (N, W--457035), 9412a (N, W--457035); J. F. Rock 2915 (W--1213239), 6932 (Ca--327229, W--1332127), 7101 (W--1511066). CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 43351 (N). HONGKONG: W. Y. Chun 6544 (Ca--357945), 6551 (Ca--357945); Ringgold & Rodgers s.n. [Hongkong] (T). THAILAND: Amnak 39 [Herb. Roy. Forest Dept. 6023] (W--2064829); Dee 455 [Herb. Roy. Forest Dept. 7741] (Ss); J. F. Rock 133 (W--1171250); Smitinand 1671 [Herb. Roy. Forest Dept. 9557] (Z); Sørensen, Larsen, & Hansen 6229 (Em). INDOCHINA: Annam: Chevalier 1708 (B, Ca--53971). Tonkin: Pételot 1629 (Ca--234336, N), 8580 (N); Tsang 29133 (Go). Province undetermined: Pételot 1523 [Phu Ha] (Ca--244155); Poilane 15598 (S). GREATER

SUNDA ISLANDS: Java: Junghuhn 3-4000 (K). Sumatra: Korthals 5816 (K), s.n. (K, K). CULTIVATED: England: Herb. Roy. Hort. Soc. s. n. [4.1.28] (Em); Richardson s.n. [Liverpool Bot. Gard., Oct. 5, '89] (Ms--30945). Germany: Herb. Kummer s.n. [1865] (Mu--1442, N--photo, Z--photo). New Zealand: W. R. Sykes 202/64 (Nz--149622).

CALLICARPA RUBELLA var. DIELSII (Léveillé) Li, Journ. Arnold Arb. 25: 425--426. 1944.

Synonymy: Viburnum dielsii Léveillé in Fedde, Repert. Sp. Nov. 9: 443. 1911. Callicarpa dielsii (Léveillé) P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 37. 1932. Callicarpa dielsii P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 18. 1932. Callicarpa rubella var. hemsleyana f. subglabra P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 41. 1932. Callicarpa rubella var. subglabra (P'ei) Chang, Act. Phytotax. Sin. 1: 297. 1951.

Bibliography: Léveillé in Fedde, Repert. Sp. Nov. 9: 443. 1911; Léveillé, Fl. Kouy-Tchéou 66. 1914; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16, 18, & 37--42. 1932; Rehd., Journ. Arnold Arb. 15: 323. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 45. 1938; Moldenke, Prelim. Alph. List Invalid Names 49. 1940; Li, Journ. Arnold Arb. 25: 425--426. 1944; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56 & 86. 1942; Moldenke, Alph. List Invalid Names 51. 1942; Moldenke, Phytologia 2: 343. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 3 & 28. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 56. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 131 & 178. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 281, 297, & 311. 1951; Moldenke, Phytologia 14: 102 (1966) and 21: 164. 1971.

Léveillé's original (1911) description of this taxon is "Planta tota villosa; rami hispido glandulosi, brunnei; folia 8--9 x 3--4 cm. fusco-viridia, subtus pallidiora, oblonga, caudato-acuminata, ad basin cordata, subsessilia crenata; nervis aliis patentibus elevatis, aliis rectis; flores corymbosi; pedunculi, pedicelli et calyces hispido-glandulosi; calyx urceolatus, vix crenatus; fructus nigrescens, primum inclusus, opacus, glaber."

P'ei comments (1932): "I have seen fragments of the type at the Arnold Arboretum. It appears to me to be closely related to Callicarpa longipes Dunn, the difference being the truncate calyx of Callicarpa Dielsii (Lévl.) P'ei while that of C. longipes Dunn. is toothed. When more abundant material is available it may be that this species will be found to be the same as some of the Kwangtung forms of Callicarpa rubella Lindl." He describes his C. rubella var. hemsleyana f. subglabra as follows: "A type recedit foliis subglabris, obovatolanceolatis, subcordatis ad rotundatis, acuminatis. Chekiang: Chenchiong, 40 miles south of Sia-chu, Alt. 450 to 900 m., Ching 1760!, June 1924, 'Shrub, 6 feet tall, rare'. A shrub with subglabrous branchlets. Leaves obovate-lanceolate, serrate, acuminate, base subcordate to rounded, sub-

glabrous on both surfaces, densely glandular beneath, sparsely glandular above, 7 to 18 cm. long, 3 to 4.7 cm. wide, chartaceous, lateral nerves about 8 on each side of the midrib. Petioles not exceeding 3 mm. in length. Cymes glabrous, glandular; peduncles glabrous, about 2.5 cm. long, slender. Calyx glabrous, glandular!

The type of *Viburnum dielsii* was collected by Pierre Julien Cavalerie (no. 385) at Pin-fa, Kweichow, China, on September 4, 1902. Li (1944) describes the taxon as "A glabrescent variety of the widely distributed species". Recent collectors describe it as a woody or semi-woody shrub, 1--2 m. tall, the leaves almost glabrous, the flowers fragrant, the corollas white, and the fruit yellow (when immature?) or black. It has been found growing in clay or sandy soil, along roadsides, at altitudes of 450--900 m., flowering in January, June to September, and November, and fruiting in July and August. While Ching calls it "rare" in Chekiang, Tsang refers to it as "fairly common scattered shrubs" in Kwangsi and "fairly common" in Kwangtung.

Li (1944) cites: CHINA: Chekiang: Chen 414, 793, 795; R. C. Ching 1760. Kweichow: Cavalerie 385; Teng 9044Ob. Kwangsi: W. T. Tsang 27598, 27922; Wang 39374, 40371. Kwangtung: W. T. Tsang 21319.

For what he regards as var. *subglabra* Chang (1951) cites the following: CHINA: Chekiang: R. C. Ching 1760. Hunan: Chang 4456. Kwangsi: Huang 40371.

Material has been misidentified and distributed in herbaria as *C. brevipes* (Benth.) Hance.

In all, 5 herbarium specimens of *C. rubella* var. *dielsii* have been examined by me.

Citations: CHINA: Chekiang: R. C. Ching 1760 (Ca--281529, W--1246638). Kwangsi: W. T. Tsang 27922 (W--1757337), 28598 (W--1757066). Kwangtung: W. T. Tsang 21319 (S).

CALLICARPA RUBELLA var. *HEMSLEYANA* Diels in Engl., Bot. Jahrb. 29: 547--548. 1900.

Synonymy: *Callicarpa chaffanjonii* Lévillé in Fedde, Repert. Sp. Nov. 9: 455, in obs. 1911. *Callicarpa rubella hemsleyana* Everett, Cat. Hardy Trees & Shrubs 16. 1942.

Bibliography: Diels in Engl., Bot. Jahrb. 29: 547--548. 1900; Lévillé in Fedde, Repert. Sp. Nov. 9: 455. 1911; Rehd. in C. S. Sarg., Pl. Wils. 3: 370. 1916; H. H. Chung, Mem. Sci. Soc. China 1 (1): 226. 1924; P'ei, Sinensia 2: 67. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 16, 35, & 40--41. 1932; Rehd., Journ. Arnold Arb. 15: 323--324. 1934; Moldenke in Fedde, Repert. Sp. Nov. 40: 104. 1936; Moldenke, Prelim. Alph. List Invalid Names 10, 12, & 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 56 & 87. 1942; T. H. Everett, Cat. Hardy Trees & Shrubs 16. 1942; Moldenke, Alph. List Invalid Names 8, 10, & 11. 1942; P'ei, Bot. Bull. Acad. Sin. 1: 3--4. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 53 & 63. 1948; Moldenke, Alph. List Cit. 4:

1011. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 131 & 178. 1949; Moldenke, Phytologia 4: 75 (1952) and 4: 191. 1953; Moldenke, Résumé 168, 174, 242, & 445. 1959; Moldenke, Phytologia 14: 52 (1966) and 21: 163, 164, & 331. 1971.

The original description of this taxon by Diels (1900) is "Foliis brevissime petiolatis demum supra sparse setulosis subtus glandulosis atque in nervis venisque sparse stellato-pilosis margine crenato-serratis serraturis quam eis typi magis distinctis. 2 m hohes Bäumchen mit 7,5 cm Stamm-Umfang. Blattspreite 10—12 x 4,5—5 cm. S Nan ch'uan; T'an chia wan, Wald (BvR 390 -- fr. Aug.1). Sehr auffallend durch die starke Reduction des Indumentes (die in Süd-China sich übrigens bereits anbahnt). Sonst von etwas stärkerer Serratur abgesehen kaum vom Typus (HB.) verschieden." The collector here referred to is Baron A von Rosthorn and the type locality is in Szechuan; the year of collection was 1891.

Rehder (1916) cites also Veitch Exped. 4318 from Szechuan and notes "This variety differs from the type of the species only in the slighter pubescence of the leaves and in their somewhat coarser serration. In Wilson's specimen, however, the under surface of the leaves is much more densely pubescent than in Rosthorn's specimen, but their dentation is much coarser and very unequal, the largest teeth being 6--8 mm. long and bearing from 1--3 small teeth near their base; the leaves measure up to 18 cm. in length and to 10 cm. in width."

P'ei (1932) cites: CHINA: Chekiang: Keng 848. Kwangtung: Chun 655; Tso 2072, 20752; Ying 744. Kweichow: Chaffanjon 2341; Laborde 2507. Szechuan: Fang 472, 1636, 6030, 6286; Rosthorn 390; E. H. Wilson, Veitch Exped. 4318. It should be noted, however, that the Chaffanjon 2341, which he cites, is the type collection of C. panduriformis Léveillé and this taxon has been reduced to synonymy under C. longipes Dunn. P'ei comments in regard to C. rubella var. hemsleyana: "This variety differs from its type by its less pubescent leaves and longer peduncles", saying nothing about the serration of the leaf-margins.

Recent collectors describe the plant as a small shrub, 1--2 m. tall, with yellow stamens, and have found it growing in the shade of woods or in light woods and open thickets, at altitudes of 500--2000 meters, flowering from May to August, and fruiting in September and November. The corollas are described as "green creamy-white" on Keng 848, "lilac" on Veitch Exped. 4318, "purple" on Ying 744, and "pink" on Chun 655 and Tso 20752. Vernacular names recorded for the plant are "ku kai t'sz" and "sai ip un mat".

Material has been misidentified and distributed in herbaria under the names C. cuspidata Roxb. and C. giraldiana Pamp. On the other hand, the Liou 884, distributed as C. rubella var. hemsleyana, is actually C. longipes Dunn, while Tsiang 5482 is typical C. rubella Lindl.

In all, 11 herbarium specimens of this variety have been examined by me.

Citations: CHINA: Chekiang: Ching 2118 (W--1246183); Keng 848 (Ca--361844). Hunan: Fan & Li 572 (Bz--13601). Kwangtung: Herb. Canton Chr. Coll. 12560 (S); To & Tsang 12008 (S); Ying 744 (Ca--358024). Kweichow: Tsiang 5315 (S). HONGKONG: Ford s.n. (N); Weiss 1586 (Bz--17563); C. Wright s.n. [Hong Kong] (W--9963). LOCALITY OF COLLECTION UNDETERMINED: A. Henry s.n. [Mt. Kellat, 28-6-93] (N).

CALLICARPA RUBELLA f. *ROBUSTA* P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 39. 1932.

Bibliography: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 39. 1932; Moldenke in Fedde, Repert. Sp. Nov. 40: 103 & 104. 1936; Moldenke, Prelim. Alph. List Invalid Names 13. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 58 & 87 (1942) and [ed. 2], 135 & 178. 1949; H.-T. Chang, Act. Phytotax. Sin. 1: 286. 1951; Moldenke, Résumé 174 & 445. 1959; Moldenke, Phytologia 14: 59 (1966), 14: 221, 226, & 228 (1967), 16: 365 (1968), and 21: 225 & 334. 1971.

P'ei's original description of this form (1932) is "A robust plant, leaves densely pubescent on both surfaces, obovate to ovate-elliptic, shortly acuminate, base cordate, 6.5 to 11 cm. long, 3 to 6 cm. wide. The densely pubescent petioles are short, not exceeding 0.8 cm. in length. The peduncles are 1.7 to 2 cm. in length, and densely pubescent. Kantung: Hainan, Five Finger Mt., McClure 9591!, May 1922, 'Shrub, 2 to 3 m. in height, flower white'; Hainan, Napong Mt., growing in ravines, Tak (Ts'ang) 850! Sept. 1927, 'Shrub, 5 feet, fruit white'; Hainan, Tsang, Tang, and Fung 154!, May 1929, 'Shrub, 1 m. in height, flowers violet'." Since he has designated no specific type, all his citations must be regarded as cotypes.

The plant has also been collected along streamsides and a vernacular name for it is "lo hai ngan". The form is obviously very similar to C. formosana Rolfe and I am not convinced that it is really a form of C. rubella. It was reduced by Chang (1951) to C. pedunculata R. Br., to which he also reduces C. formosana. Tsang [Tak] 850 was cited by me as C. formosana in Phytologia 14: 221 & 226 (1967) and F. A. McClure 3038 as C. formosana f. albiflora Yamamoto in Phytologia 14: 228. Material has also been misidentified and distributed in herbaria under the names C. giraldiana Hesse and C. macrophylla Vent.

In all, 6 herbarium specimens, all cotypes, have been examined by me.

Citations: CHINESE COASTAL ISLANDS: Hainan: F. A. McClure 3038 [Herb. Canton Chr. Coll. 9591] (Ca--366340--cotype, Ph--cotype); W. T. Tsang 850 [Herb. Lingnan Univ. 16349] (Ca--326102--cotype, N--cotype, W--1249840--cotype); Tsang, Tang, & Fung 154 [Herb. Lingnan Univ. 17685] (N--cotype).

CALLICARPA RUDIS S. Moore, Journ. Bot. Lond. 63: Suppl. 80. 1925.

Bibliography: S. Moore, Journ. Bot. Lond. 63: Suppl. 80. 1925; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 63 & 87. 1942; Moldenke, Alph. List Cit. 1: 207. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 143 & 178. 1949; Moldenke, Résumé 187 & 445. 1959.

The original description of this species by Moore (1925) is "Arbor? vel frutex?; ramulis tetragonis crebro ramosis furfuraceo-fulvo-tomentosis postea glabrescentibus; foliis petiolatis (prt. \pm 1 cm. long.) ovatis obtusis basi obtusis nisi rotundatis margine repandis vel repando-denticulatis papyraceis pag. sup. glabris costisque impressis pag. inf. minute farinoso-tomentosis costisque (utrinque 6) costulisque uti reticulum eminentibus plerisque 6--10 x 4--4.5 cm.; cymis petiolis subaequilongis breviter pedunculatis plurifloris uti pedicelli circa 2 mm. long. et calyx et corolla farinoso-tomentosis; calyce truncato 1.5 mm. long.; corollae tubo calyce paullo longiori (2 mm. long.) lobis ovatis obtusis 1.5 mm. long.; antheris subinclusis fere 2 mm. long.; ovario farinoso-tomentoso; drupa depressa globosa 3 mm. diam. S.; Kotta Djawa, Lampongs, 300 ft. 1355c. The relatively short and broad almost entire leaves are a striking feature of the species."

My own observation, however, is that the leaf-blades are plainly dentate on some specimens of this plant. It is obviously closely related to C. erioclona Schau.

In all, 3 herbarium specimens of what is probably a part of the type collection, and 1 mounted photograph of C. rudis have been examined by me.

Citations: GREATER SUMBA ISLANDS: Sumatra: H. C. Forbes 1355a (N--isotype, N--isotype, N--photo of isotype, Vu--isotype).

CALLICARPA SACCATA Steen., Blumea 15: 147--149, fig. 2 a--j & 1--o. 1967.

Bibliography: Van Steenis, Blumea 15: 147--149, fig. 2 a--j & 1--o. 1967; Van Steenis, Biol. Abstr. 49: 4205. 1968; Moldenke, Résumé Suppl. 16: 12. 1968; Moldenke, Phytologia 20: 495 (1971) and 21: 39 & 40. 1971.

Illustrations: Van Steenis, Blumea 14: 148, fig. 2 a--j & 1--o. 1967.

Van Steenis (1967) describes this species as follows: "Affinitate C. havilandii differt foliis ovato-oblongis, longe acuminatis, basi abrupte attenuatis, in saccas duas auriculiformis productis; flores tetrameri. Typus, Sarawak, Sibat ak. Luang S 23637 (L). — Fig. 2. A treelet 3--6 m; stems 3--7 1/2 cm Ø. Indument conspicuous, all over coarsely brown hispid by more-celled, more or less tubercle-based hairs, further a very short, puberulous tomentum consisting of simple and stellate hairs, sparsely on the leaf, densely and brownish on the stem and cymes; undersurface of the leaves besides with fairly dense regularly interspersed, fine, pitted glands, on the auricled lobes also large nectarial glands. Leaves ovate- to elliptic-oblong, apex long-acuminate, base rounded and \pm abruptly narrowed, equal-sided or unequal-sided, widened into

two auriculiform, bullate sacs 1 — 1 1/2 cm long; margin shortly dentate; blade proper c. 10--17 by 5--11 cm, in some specimens markedly anisophyllous; petiole 1/2 — 1 1/2 cm. Cymes fairly many-flowered, axillary on the old wood, c. 2 — 2 1/2 cm long. Flowers 4-merous. Calyx outside densely and shortly brown stellate-hairy, inside sparsely stellate-hairy, hypanthium in flower thicker upwards; fruit calyx more distinctly cup-shaped with 4 minute teeth. Corolla tube twice as long as the 4 oblong blunt lobes, in total c. 7 1/2 mm long. Stamens not protruding, style slightly so. Ovary 4-celled, each cell with 2 dissepiment-attached ovules. Fruit almost globular, c. 4 mm \varnothing , with scattered, yellow, pulverulent glands (as on the ovary), breaking up into 8 segmental pyrenes; pericarp withering; each **pyrene** containing a small seed without endosperm and with 2 cotyledons in a small outer cavity; besides all pyrenes with an inner empty, air-filled cavity, obviously capable of floating."

The type of this curious species was collected on a hillslope at Bt Iju, Ulu Arip, Balingian, at an altitude of 60 meters, Sarawak (Sarawak Herb. 23637), and is deposited in the herbarium of the Rijksherbarium at Leiden. Van Steenis (1967) cites also Ashton S.18286, Hirano & Motta 1113, E. Wright S.23866, and Sarawak Herb. 23773 & 23728, all from Sarawak. He comments "From the lowland to c. 450 m, on hill slopes, land slips along river, clayey or sandy-clay soils. Ashton noted of his specimens that branches are weak and sagging to the ground. The fruit is red or bright red, petals, stamens, and style white; all parts covered with rusty hairs." He also remarks that "The species makes part of an assemblage of rusty-rough-haired species of Borneo and the Philippines. Its most remarkable feature is the sac-like auricles at the base of the blade, reminding exactly of those of some tropical American Melastomataceae belonging to the group of genera Tococa, Myrmedone, Maleta, Microphysca, and Calophysa, which have a similar formicarium. Of course, some other plants have glandular auricles, as Adenia, but these are much smaller and not ant-inhabited, like in ours. Thus it represents another example of convergence among formicaria (compare Beccari, Kalesia 2: 234). In looking up some literature on the American genera mentioned above I found that Gleason (in Pulle, Fl. Surin. 3, 1935, 235) remarked that in Tococa guianensis 'formicaria are sometimes absent'; whether he means from some specimens or only occasionally from some leaves is not quite clear. Anyway, in this new Callicarpa all leaves possess these unique sacs. It is remarkable that the cauliflorous inflorescences (only collected by Ashton) differ markedly in structure from the axillary ones. This is also found in C. involucrata.....; they are hardly branched fascicles on knobs.....Affinity. Doubtless allied to C. havilandii (K. & G.) H. J. Lam, C. superposita Merr., C. barbata Ridl., C. fulvohirsuta Merr., all of Borneo; but the affinity affects also some Philippine species. The present occasion shows the need of a thorough revision of this group."

The species is known to me only from the literature. It should be noted here, however, that if Van Steenis is correct in assigning this plant to the genus Callicarpa, it will be the first known species in the genus to have two ovules per ovary-cell and 8 seeds in the 8-segmented pyrenes.

CALLICARPA SALVIAEFOLIA Griff., Itin. Notes [Posthum. Papers 2:] 94 [as "salviae folia"]. 1848.

Synonymy: Callicarpa salvifolia Griff., Itin. Notes [Posthum. Papers 2:] 406, nom. subnud. 1848. Callicarpa salviifolia Griff. apud A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933.

Bibliography: Griff., Itin. Notes [Posthum. Papers 2:] 94 & 406. 1848; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Razi, Rec. Bot. Surv. India 18: 9. 1959; Moldenke, Résumé Suppl. 4: 7 & 11. 1962.

The original description of this taxon by Griffith (1848) is merely "1390. Frutex humilis ramosus baccis albis. Hazoo." Hill (1933) states that it is native to Khasia, India. Razi (1959) cites it as "ASSAM: Khasias" and claims that it is mentioned in Journ. Bot. Lond. 63: 406 (1925), but I fail to find it there; in fact, the pages do not go that high in that volume. Nothing is known to me of this taxon except what is said of it in the literature listed above.

CALLICARPA SELLEANA Urb. & Ekm. ex Urb., Arkiv Bot. 22A (17): 108. 1929.

Bibliography: Urb., Arkiv Bot 22A (17): 108. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 37. 1933; Moldenke in Fedde, Repert. Sp. Nov. 39: 303 (1936) and 40: 49--51, 53, 120, & 123. 1936; Moldenke, Geogr. Distrib. Avicenn. 7. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 26 & 87. 1942; Moldenke, Alph. List Cit. 1: 185 & 188 (1946) and 4: 1062 & 1066. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 47 & 178. 1949; Moldenke, Résumé 56 & 445. 1959; Moldenke, Phytologia 14: 150. 1966; J. A. Clark, Card Ind. Gen. Sp. Pl. n.d.

In all, 7 herbarium specimens of C. selleana, including the type, and 4 mounted photographs have been examined by me.

Additional & emended citations: HISPANIOLA: Haiti: Ekman H. 1584 (I--photo of type, W--1411861--isotype, W--1479490--isotype), H.7995 (Mi--photo).

CALLICARPA SHAFERI Britton & P. Wils. in N. L. Britton, Mem. Torrey Bot. Club 16: 96--97. 1920.

Bibliography: N. L. Britton, Mem. Torrey Bot. Club 16: 96--97. 1920; J. A. Clark, Card Ind. Gen. Sp. Pl. 1920; A. W. Hill, Ind. Kew. Suppl. 6: 34. 1926; Moldenke in Fedde, Repert. Sp. Nov. 39: 300 (1936) and 40: 70--73, 119, 121--123, 125, & 129. 1936; Moldenke, Geogr. Distrib. Avicenn. 5. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 24 & 87. 1942; Moldenke, Alph. List Cit. 1: 11, 66, 186, 187, 221, & 316. 1946; H. N. & A. L. Molden-

ke, Fl. Life 2: 83. 1948; Moldenke, Alph. List Cit. 2: 424 & 486 (1948), 3: 867 & 928—930 (1949), and 4: 1038 & 1043. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43, 45, & 178. 1949; Alain in León & Alain, Fl. Cuba 4: 304 & 306. 1957; Moldenke, Résumé 50, 53, & 445. 1959; Moldenke, Phytologia 14: 154 (1966) and 21: 333. 1971.

Recent collectors have found this plant growing near brooks, flowering and fruiting in August. The Acufia & Roig 16765, distributed as C. shaferi, is actually the type collection of C. cubensis var. parviflora Moldenke. Cuesta 1017 and Ekman 11909 & 17930, previously cited by me as anomalous C. shaferi, are also now better placed in C. cubensis var. parviflora.

In all, 16 herbarium specimens of C. shaferi, including the type, and 10 mounted photographs has been examined by me.

Additional & emended citations: CUBA: Pinar del Río: Shafer 333 (I—photo), 13526 (E—862661—isotype, F—493059—isotype, M1—photo of isotype, W—1047863—isotype), 13532 (F—493060, W—1047864); Shafer & León 13526 [Shafer 3213] (Ha—isotype), 13532 [Shafer 3214] (Ha). ISLA DE PINOS: Britton & Wilson 14845 (F—459797, W—793478).

CALLICARPA SHIKOKIANA Mak., Bot. Mag. Tokyo 6: 54, hyponym (1892) and 18: 46—47. 1904.

Bibliography: Mak., Bot. Mag. Tokyo 6: 54. 1892; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 73. 1901; Mak., Bot. Mag. Tokyo 18: 46—47 (1904) and 24: 28. 1910; C. K. Schneid., Ill. Handb. Laubholz. 593. 1911; J. Matsum., Ind. Fl. Jap. 2 (2): 530. 1912; Koidz., Bot. Mag. Tokyo 39: 8. 1925; Nakai in Nakai & Koidz., Trees & Shrubs Indig. Jap., ed. 2, 1: 461. 1927; Nakai in Shirasawa, Icon. Essenc. Forest. Jap. 2: [Terasaki, Zoku Nipp. Syokubutzu] fig. 2484. 1938; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 73. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 58 & 87. 1942; Hara, Enum. Sperm. Jap. 1: 185. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 178. 1949; Hatus., Journ. Jap. Bot. 26: 372. 1951; Moldenke, Phytologia 5: 100. 1954; Masamune, Sci. Rep. Kanazawa Univ. 4: 47. 1955; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 73. 1959; Moldenke, Résumé 172, 248, & 445. 1959; Kitamura & Okamoto, Col. Illustr. Trees & Shrubs Jap. 219. 1960; Ohwi, Fl. Jap. 764. 1965; Moldenke, Phytologia 14: 162 (1966) and 21: 380. 1971.

Illustrations: Nakai in Shirasawa, Icon. Essenc. Forest. Jap. 2: [Terasaki, Zoku Nipp. Syokubutzu] fig. 2484. 1938.

In his original publication of this binomial Makino (1892) said merely "sp. nov. Tosamurasaki. Tosa: Iburi, Mt. Imano (T. Makino)". Since the name can be associated with a specimen, it is thus not a true nomen nudum but is what is called a hyponym in the original definition of that term. Makino validated the name in 1904 by means of the following description: "A small tree; branchlets slender, pulvereo-pubescent with curved short minute hairs, mixed with min-

ute granular glands. Leaves opposite, shortly petiolate, elliptical-lanceolate, caudately long-acuminate, attenuately cuneate toward the base, coarsely dentate with acute deltoid or depressed-deltoid teeth or obtuse ovato-deltoid teeth excepting the upper and lower portions which are entire, 4—13 cm. long, 2—4 cm. broad, membranaceous, thinly disparsed with pubescent hairs and minute granular glands on both surfaces, and hairs denser on the midrib and lateral veins; midrib prominent beneath; lateral veins 5—6 on each side, ascending, reaching the teeth; petiole pubescent, 5—8 mm. long. Cyme supra-axillary, rather densely many-flowered, peduncled, shorter than leaves but much exceeding the petiole, divaricately branched, 2 — 3 1/2 cm. across; peduncle erect-patent or patent or slightly reflexed, 12—18 mm. long, straight, pubescent and covered with minute granular glands as are branches of the cyme; bracts minute, linear or lato-linear, thinly pubescent externally. Flowers small, 3 mm. across, white, shortly pedicellate, disparsed with minute granular glands. Calyx 1 mm. long; broadly obconico-campanulate, 4-nerved, shallowly 4-toothed, teeth depressed-deltoid, acutish. Corolla exceeding the calyx, shortly campanulate-infundibuliform, 4-lobed, about 2.5 mm. long; lobes patent, orbicular, shorter than the tube. Stamens 4, much exerted; filament filiform, glabrous, 4 mm. long; anther elliptical, 2-auriculate at the base, with granular glands on the back. Style filiform, glabrous, scarcely longer than the stamen; stigma shortly obconical and truncate. Ovary minute, included within the calyx, globose, with granular glands. Berry numerous, 2 mm. across, purple. Flowers on July—August. Hab. Prov. Tosa: Iburi (T. Makino! Oct. 25, 1885), Mt. Imano in Hata-gōri (T. Makino! Aug. 7, 1889)."

Callicarpa yakusimensis Koidz. is given as a synonym of C. shikokiana by Hatusima (1951) and Ohwi (1965), but I regard Koidzumi's name as belonging in the synonymy of C. japonica var. luxurians Rehd. Schneider (1911), in his discussion of what is now called C. dichotoma (Lour.) K. Koch, says "Hier scheint sich C. Shikokiana Mak.....aus Japan, prov. Tosa, anzuschliessen, die auch nur 5—8 mm lange B[latt]-Stiele hat, in den B[lättern] und sonst aber sich mehr C. japonica zu nähern scheint."

Material of C. shikokiana has been misidentified and distributed in herbaria under the name C. yakushimensis Koidz. On the other hand, the E. H. Wilson 6050, distributed as C. shikokiana, is actually C. oshimensis Hayata.

In all, 2 herbarium specimens of C. shikokiana have been examined by me.

Citations: KYUKYO ISLAND ARCHIPELAGO: Yakushima: G. Masamune s.n. [Yakushima, Aug. '37] (N); Tagawa & Motozi 1847 (Ws).

xCALLICARPA SHIRASAWANA Mak., Bot. Mag. Tokyo 24: 28—29. 1910.

Synonymy: Callicarpa shirasawana Mak. ex C. K. Schneid., Illustr. Handb. Laubholz. 591. 1911. Callicarpa mollis x japonica

Schneid., Illustr. Handb. Laubholz. 591. 1911. Callicarpa mollis Shirasawa ex Nakai, Journ. Jap. Bot. 14: 641, in syn. 1938 [not C. mollis Koord., 1966, nor Matsumura, 1922, nor Req., 1839, nor Sieb. & Zucc., 1844, nor Willd., 1840]. Callicarpa japonica x mollis Rehd., Man. Cult. Trees, ed. 2, pr. 1, 804, in syn. 1940. Callicarpa japonica Thunb. x C. mollis Sieb. & Zucc. ex Hara, Enum. Sperm. Jap. 1: 185, in syn. 1948. Callicarpa japonica x mollis Mak. ex Rehd., Bibl. Cult. Trees 584, in syn. 1949. Callicarpa mollis "sensu Shirasawa" apud Rehd., Bibl. Cult. Trees 584, in syn. 1949. Callicarpa x shirasawana Mak. ex Li, Morris Arb. Bull. 14: 7. 1963.

Bibliography: Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 14 [Tafel 10], fig. 8. 1895; Shirasawa, Nippon Shinrin Jumoku Dzufu [Icon. Essenc. Forest. Jap.] 2: pl. 70, fig. 20—27. 1908; Mak., Bot. Mag. Tokyo 24: 28—29. 1910; C. K. Schneid., Illustr. Handb. Laubholz. 591. 1911; J. Matsum., Ind. Pl. Jap. 2 (2): 530. 1912; Prain, Ind. Kew. Suppl. 4, pr. 1, 34. 1913; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 24. 1921; Nakai, Trees & Shrubs Indig. Jap., ed. 2, 1: 462, fig. 219. 1927; Moldenke in Fedde, Repert. Sp. Nov. 40: 86 & 115. 1936; Nakai, Journ. Jap. Bot. 14: 641. 1938; Rehd., Man. Cult. Trees, ed. 2, pr. 1, 804 & 932. 1940; Moldenke, Prelim. Alph. List Invalid Names 12 & 13. 1940; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 71 & 87. 1942; T. H. Everett, Cat. Hardy Trees & Shrubs 16. 1942; Moldenke, Alph. List Invalid Names 10 & 11. 1942; Hara, Enum. Sperm. Jap. 1: 185. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 83. 1948; Rehd., Bibl. Cult. Trees 584. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 157 & 178. 1949; Moldenke, Phytologia 3: 380. 1950; W. J. Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 358 & 359. 1951; Prain, Ind. Kew. Suppl. 4, pr. 2, 34. 1958; Moldenke, Am. Midl. Nat. 59: 335. 1958; Moldenke, Résumé 171, 214, 244, 245, & 445. 1959; Krüssmann, Handb. Laubgeh. 1: 253 & 255. 1959; Rehd., Man. Cult. Trees, ed. 2, pr. 9, 804 & 932. 1960; Kitamura & Okamoto, Col. Illustr. Trees & Shrubs Jap. 220. 1960; Li, Morris Arb. Bull. 14: 7. 1963; Ohwi, Fl. Jap. 764 & 998. 1965; Moldenke, Phytologia 13: 431 & 433 (1966), 14: 142 (1966), 14: 254 (1967), 15: 30 & 34 (1967), and 21: 43, 240, & 382. 1971.

Illustrations: Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] pl. 14 [Tafel 10], fig. 8 [as "C. mollis"]. 1895; Shirasawa, Nippon Shinrin Jumoku Dzufu [Icon. Essenc. Forest. Jap.] 2: pl. 70, fig. 20—27 [as "C. mollis"] (in color). 1908; Nakai, Trees & Shrubs Indig. Jap., ed. 2, 1: 462, fig. 219. 1927.

Makino's original (1910) description of this plant is as follows: "A small deciduous shrub, ramose; branches terete, umber; branchlets erect-patent, rather thinly (but denser towards the top) adpressedly covered with stellate hairs; bud densely covered with

stellate hairs. Leaves petiolate, opposite, obovato-lanceolate, obovato-oblong, elliptical, but often ovato-elliptical in the inferior ones, abruptly caudato-acuminate at the apex, acute or obtuse at the base, serrate, chartaceous, shortly thin-puberulent and minutely thin-granulato-glandular above, sparingly stellate-hairy and minutely granulato-glandular beneath, 2 1/2 — 11 cm. long, 1 1/2 — 3 3/4 cm. broad; midrib prominent beneath; veins about 5—8 on each side, erect-patent, somewhat arcuate upwards; veinlets finely reticulated beneath; petiole rather thinly covered with stellate hairs, 4—11 mm. long. Cymes axillary, small, much shorter than the leaves but exceeding the petiole, many and densely flowered, peduncled; peduncle strict, usually longer than the petiole, densely or thinly covered with stellate hairs, attaining about 10 mm. long in flower; branches and pedicels short, thinly covered with simple forked and stellate patent hairs; bracts minute, linear, obtuse, ciliated, deciduous, very rarely leafy and about 1 cm. long; bracteoles usually shorter than the pedicels. Flowers small, lilac; pedicel shorter than the flower. Calyx short-campanulate, 4-fid with obtuse sinuses, viridescent, thinly pubescent and ciliated with simple forked and stellate patent hairs, dispersed with minute granular glands, about 2 mm. long in flower, persistent and slightly enlarged in fruit; lobes deltoid, subobtusate. Corolla exserted, scarcely longer than twice of the calyx, dispersed with minute granular glands externally; limb patent, 4-fid; lobes orbicular; tube campanulate, longer than the limb. Stamens 4, exserted, erect, inserted at the base of the corolla-tube; anther rather large, lato-oblong, bifid at the base, nearly 2 mm. long, covered with minute granular glands towards the connective on both sides; filaments filiform, glabrous. Style erect, exceeding the stamens in height, filiform, gradually enlarged above, glabrous; stigma thickish, obliquely truncate; ovary globular. Fruit violet, globose, smooth, 4—6 mm. across, more or less exceeding the persistent hirtello-pubescent calyx; pyrenae oblong, compressed, hardly curved, smooth, stramineous, about 3 mm. long. Nom. Jap. Inumurasakishikibus (nov.) Hab. Prov. Musashi: Tokyo Bot. Gard. Koishikawa, cult. (T. Makino! June 13, and July 26, 1895, Dec. 1909).

"Probably a hybrid between Callicarpa japonica Thunb. and C. mollis Sieb. et Zucc., and the plant in the Botanic Garden of the University of Tokyo is the only living specimen hitherto known. It differs from C. japonica Thunb., which has the thinner and glabrescent leaves and shallowly lobed calyx; and from C. mollis Sieb. et Zucc., which bears the more densely hairy leaves, more deeply lobed and more hairy calyx, larger flower, and fewer-flowered cyme."

Nakai (1938) adds "This plant is an hybrid between Callicarpa japonica and Callicarpa mollis with the characters of the former more predominated. The Korean specimens bear the leaves like those of Callicarpa japonica f. rhombifolia". He cites Nakai

12078 from Kaitō Island, Korea. Li (1963) says of the hybrid "It occurs naturally around Tokyo (Nakai 1922). It has elliptic to ovate-lanceolate or ovate-oblong leaves which are serrate along the margins and sparingly fasciculate-pubescent and glandular beneath. The calyx is distinctly lobed and the flowers lilac in color. A small plant of this hybrid is represented in the Morris Arboretum collection."

Schneider (1911) says "Nach Makino.....hat Shirasawa keine typische mollis abgebildet, sondern wahrscheinlich eine mollis x japonica, die Makino als C. Shirasawana beschreibt. Doch sind die Bl[ätter]-Unterschiede gegen mollis gering, diese ist noch reicher beh[aart] und der K[elch] noch tiefer geteilt."

In my 1936 work I followed Bakhuijzen van den Brink (1921) and reduced xC. shirasawana to synonymy under typical C. japonica Thunb. because specimens seen by me up to that time so labeled in herbaria and taken from horticultural material seemed indistinguishable from typical C. japonica. Apparently these specimens were misidentifications.

It should be noted here that the C. mollis accredited to Koorders in the synonymy given above is actually a synonym of C. caudata Maxim., that of Matsumura is C. oshimensis var. okina-wensis (Nakai) Hatus., that of Requier and of Willdenow is C. acuminata H.B.K., and that of Siebold & Zuccarini is a valid species.

The hybrid has been found in the wild state -- contrary to Makino's statement -- at 300 meters altitude, flowering in June, and the common names "inu-murasaki" and "inu-murasakisikibu" are recorded for it, in addition to the variant listed by Makino. Bean (1951) states that it was introduced into the horticultural trade in 1895, but on what he bases this statement is not clear.

The W. R. Sykes 4/65, distributed as xC. shirasawana, is actually only C. japonica Thunb.

Thus far only a single herbarium specimen undoubtedly representing this hybrid has been seen by me.

Citations: JAPAN: Honshu: Murata 16421 (W-2909694).

CALLICARPA SIMONDII Dop, Bull. Soc. Hist. Nat. Toulouse 64: 506--507. 1932.

Bibliography: P. Dop, Bull. Soc. Hist. Nat. Toulouse 64: 500, 506--507 & 512. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 46. 1938; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 59 & 87. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 83. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 178. 1949; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Moldenke, Résumé 175 & 445. 1959.

The original description of this plant by Dop (1932) is "Frutex? Ramuli subquadrangulares tomento denso farinoso stellato obtecti. Folia membranacea, elliptica vel paullo elliptico-obovata, basi obtusa interdum acuta, abrupte et breviter acuminata, regulariter et tenuiter denticulata praeter basim....." [to be continued]

BOOK REVIEWS

Alma L. Moldenke

"RHIZOCTONIA SOLANI, BIOLOGY AND PATHOLOGY" edited by J. R. Parmeter Jr., iv & 255 pp., illus., University of California Press, Berkeley, California 94720, Los Angeles, California & London. 1971. \$11.50.

This fine monographic study has had a long gestation: conceived by an American Phytopathological Society Symposium at Miami in 1965, prefaced in 1967, dated by Library of Congress Catalog card 1969, copyrighted 1970, and published 1971. Its main well-fulfilled goals are "(1) to bring together and integrate all of the available information on R. solani [specific epithet capitalized on p. 199] in all of its various aspects, and (2) to compile a literature list that, directly or indirectly, provides access to all of the important works [more than 1,000 references, only 2 as late as 1968, so that]....any worker needing information or contemplating research on R. solani can start with this volume, knowing that the literature has been thoroughly reviewed."

Part I covers a century of historical survey, taxonomy of the imperfect and perfect (basidiomycete Thanatephorus cucumeris (Frank) Donk) stages, morphology and cytology, and asexual and parasexual recombination, mutation and heterokaryosis mechanisms of variation in this "fungus that occurs throughout most, if not all, of the world's land mass."

Part II deals with the physiology, metabolism, colonization and soil growth of this organism as a saprophyte.

Part III deals with all phases as a pathogen -- the diseases, penetration, epidemiology and control. R. solani "probably causes more different types of diseases to a wider variety of plants over a larger part of the world and under more diverse environmental conditions, than any other plant-pathogen species."

There are many excellent line drawings and photographs especially of ultrastructures, cultures and pathological effects. The work is well indexed.

"REMOTE SENSING: With Special Reference to Agriculture and Forestry" by the Committee on Remote Sensing for Agricultural Purposes, National Research Council, xiii & 424 pp., illus., National Academy of Sciences, Washington, D. C. 20418. 1970. \$12.95.

The detecting and characterizing of many agricultural and forestry phenomena as well as other surveys of the earth's surface have recently been revolutionized by the remote sensing techniques using "the ultraviolet, visible, infrared, and micro-

wave regions of the electromagnetic spectrum to collect data that give a measure of the reflectance, emittance, dielectric constant, surface geometry, and equivalent black-body temperature of plants, soils, and water". These data will permit (a) identification and area measurements of the major agricultural crop types; (b) mapping of soil and water temperatures; (c) mapping of surface water, including snowpack; (d) mapping of disease and insect invasions; (e) mapping of gross forest types; (f) mapping of forest-fire boundaries; (g) assessment of crop and timber-stand vigor; (h) determination of soil characteristics and soil moisture condition; (i) delineation of rangeland productivity; (j) mapping of areas of high potential forest-fire hazard; and (k) mapping of major soil boundaries.

There are papers by several different scientists working in this nascent field, each with its own bibliography. The statistical problems are in themselves difficult, but are presented with clarity. The present and future research needs are mind-staggering. The illustrations consist of copious charts and wonderful photographs, many aerial and often in color. This book will surely be the definitive one in the field for a while, yet it has no general index.

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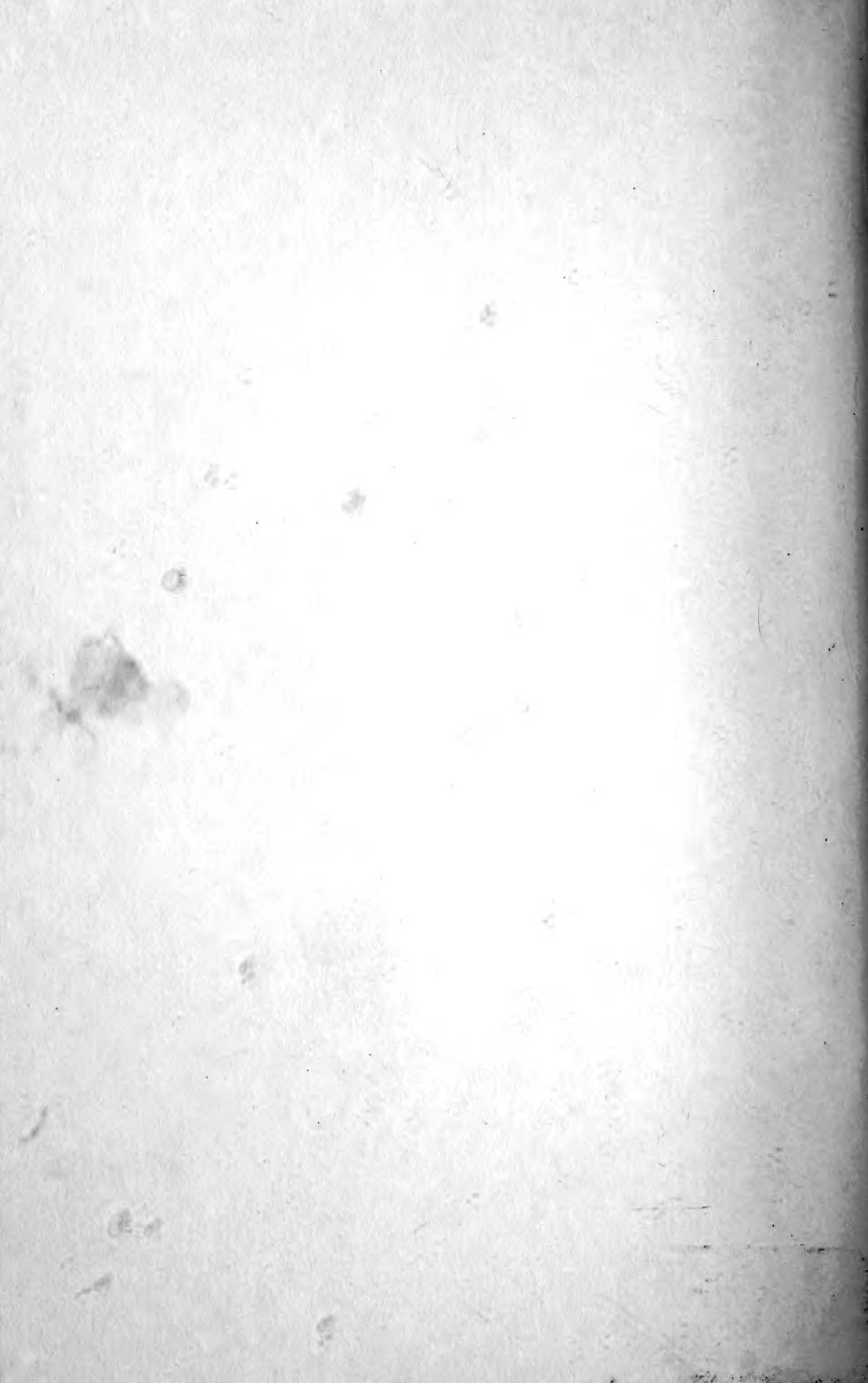
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Publication dates of Volume Twenty-one

- No. 1 — January 4, 1971
 No. 2 — March 4, 1971
 No. 3 — April 5, 1971
 No. 4 — May 13, 1971

- No. 5 — June 9, 1971
 No. 6 — July 15, 1971
 No. 7 — July 22, 1971





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